

Pacific Discoveries



PUBLISHED BI-MONTHLY BY THE CALIFORNIA ACADEMY OF SCIENCES

IN THIS ISSUE: *Harold C. Conklin*

Aldo Leopold • *Don Bleitz* • *Victor B. Scheffer*

Borys Malkin

VOLUME II • NUMBER 4

July-August 1949

FIFTY CENTS

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

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In This Issue

Búngiw—Girl of the Hanunóo. A young man of her tribe on the Philippine Island of Mindoro will make love to her in lyrics written on bamboo. After marriage she'll discard her breast band.

Photograph by HAROLD C. CONKLIN . . . Cover

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Pre-Discovery

"... The agent signaled us. We got up and ran to close the ropes. I will never forget that run. Each of the running reindeer in the valley was . . . an escaping aggregate of steaks, chops, and roasts. . . The deer, in complete terror, were charging down upon us, a thousand head strong. . ."

Two biologists, sent to the Pribilofs to study fur seals, unexpectedly found themselves 'punchers' in a "Reindeer Roundup" on St. Paul, compared to which our latter-day Wild West shows look tame. "Rounding up reindeer was not exactly in line with our official duties," writes Albert H. Banner in the next issue, but "it sounded interesting," and "reindeer meat was needed for the winter." The two Fish and Wildlife boys earned their share of the filets, that "brisk fall day" in the Pribilofs!

We didn't plan an adventure issue, but we also had on the hook a breezy tale by Collector Donald A. Simpson of the Academy's Steinhart Aquarium. Seems Don fell for a proposal to take the Aquarium truck to Guaymas, Mexico, and bring back a few hundred live fish from the Gulf of California. "Be like a vacation for you and Helen," the Director said. Fine new road to Guaymas, reports said. Well, the Simpsons found the road fair—when surfaced, which it mostly wasn't—but had failed to read the fine print where it said (or did it?) bridges hadn't yet been inserted between sections of road leading from one *arroyo seco* to the next. Apparently they were an afterthought, or not thought of. "Bringing Them Back Alive Can Be Killing," the Simpsons learned, especially when the *arroyos* are no longer *seco*!

Discovering PD's Authors

As a youngster playing Indian Harold C. Conklin began wanting to be an anthropologist. A GI in the Philippines at the end of World War II, he elected to muster out where he was—in one of the richest fields for research in primitive

cultures. He had a priceless tool to go with working enthusiasm—the gift of tongues. Living with the Hanunóo to study their culture, he became absorbed in the "Bamboo Literacy on Mindoro," and brought back hundreds of knife-cut manuscripts to work on while an undergraduate in Anthropology at the University of California, Berkeley. Between semesters we found him compiling a dictionary.

In the field he pioneered in this country, no one out-ranked Aldo Leopold. At his untimely death in April, 1948, the father of our Conservation Editor A. Starker Leopold was head of the Department of Wildlife Management in the University of Wisconsin. The senior Leopold was more than leading expert in a new science; he was a rarely gifted writer. His *Game Survey of the North Central States* (1931) and *Game Management* (1933) are for the wildlife specialists, but the book he did not live to see published, *Sand County Almanac*, will take its place among the great in American naturalists' works. We are indebted to his son and to Mr. Philip Vaudrin of the Oxford University Press, New York, for permission to print here the essay "Wildlife in American Culture" (first published in the *Journal of Wildlife Management*, Vol. 7, No. 1, 1943). OUP has scheduled *Sand County Almanac* for this fall.

Don Bleitz' "Sandhill Cranes at Sunset" is a peculiarly fitting accompaniment to Aldo Leopold's essay. Sandhill cranes were Dr. Leopold's favorite form of wildlife. Moreover, he spent his first 15 professional years with the U. S. Forest Service in New Mexico, and had a leading part in the establishment of waterfowl refuges in that state.

Sea-going biologist, Dr. Victor B. Scheffer ("Dolphins"), whose GHQ is the Branch of Wildlife Research, U. S. Fish and Wildlife Service, Seattle, is spending the summer in the Pribilofs.

After his recent "Nigerian Odyssey" our itchy-footed entomologist-correspondent Borys Malkin would not, we venture, recommend that corner of Africa to tourists—bug-collectors are crazy to start with. D.G.K.

Pacific Discovery is published bi-monthly at the Gillick Press by the California Academy of Sciences. Publication office: 2057 Center Street, Berkeley 4, California. Editorial and Advertising offices: Golden Gate Park, San Francisco 18,

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California. Subscriptions: \$3 per year. Single copies: 50c. Members of the Academy subscribe through their dues. Entered as second-class matter February 17, 1948 at the post office at Berkeley 4, California, under the act of August 24, 1912.

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

FROM THE READER

Conservation

Sirs:

... I was especially interested in the articles by Joel Hedgpeth, A. Starker Leopold, and Walter C. Lowdermilk [PD, Vol. I, Nos. 1-5] on the problem of conservation. Most of my life I have lived in the eastern and southeastern parts of the U.S. where I have seen the forests disappear and the fish and game supply almost depleted. I have seen stream after stream, which at one time ran clear all summer long and afforded good fishing, become nothing but ditches filled with oozy mud. In the South I have seen cattle tracks in overgrazed land become gullies ten feet deep, and I once watched a ten acre corn field on a steep hillside gradually fill a fertile valley, first with rich top soil, then with sterile gravel.

A little over two years ago we settled on the Pacific Coast, and, until the advent of *Pacific Discovery*, we heard almost nothing about the conservation of natural resources in this region except the current controversy over timberlands in the Olympic National Forest. This leads me to concur with the opinion of Mr. [Charles C.] Bradley, who says in a letter in the July-August [1948] PD, "... I feel you owe your readers some equally clear thinking on the solution of the problem."

However, before anything on a large scale can be done towards achieving real conservation, we must have facts; not just expressions of personal opinion, but facts so basic that they will stand up against criticism from any quarter. On the one hand we have such books as *Our Plundered Planet* by [Fairfield] Osborn and *Road to Survival* by William Vogt, which paint a pretty bleak future for civilization as a result of our indifference to the wasting of our natural resources. On the other hand, there are voices raised over the land branding such views as alarmist. Quite often these voices are selfish interests who can see no farther than today's gain, but they are very vocal none the less.

It seems to me that the overall problem of conservation must by necessity become a Federal problem and the solution a Federal solution. To attempt to put into effect proper conservation practices over the entire country by piecemeal fashion may be too slow, and may help defeat the end towards which we are striving, since no one area in the country is so isolated that conservation practices in one area don't affect other areas.

To overcome the very vociferous objections to any Federal plan for conservation, by selfish interests and by those who hold the view that states' rights are more sacred than the future of civilization itself, we must have an overall picture of exactly what is happening and has happened to our natural resources over the entire country. Such a survey, probably by well defined regions, should be conducted by cooperative groups over the entire country, in such a way that there is no doubt as to the accuracy of their findings. Perhaps such a project could be initiated by the various state Academies of Science on a cooperative basis. I believe that this information already exists for most parts of the country, but it has never been properly correlated for the country as a whole and presented to the people in such a way that they will demand and welcome appropriate Federal legislation. Such a survey, if it did nothing else, could settle once and for all whether Mr. Osborn, Mr. Vogt, and hundreds of others have cried "wolf" once too often to be taken seriously, or whether we do face a situa-

tion which demands a speedy and perhaps rather radical method of solution.

It is my belief that the ultimate solution of our conservation problem probably lies in the realm of Federal zoning of all land surfaces. If such is the case, conservationists must have the facts at hand so that they know whereof they speak and they have a real task ahead of them. It is a job which will require the combined efforts of cooperating groups from every state in the union.

PHILLIPS B. FREER

Grayland, Washington

Research on The Ex-Reader

During the past three or four months the editor has sent personal letters to about one third of all PD first year subscribers who for one reason or another did not renew. Space was provided for giving reasons or for requesting renewal, and a "postage paid" envelope enclosed. Results of this sample are interesting. A gratifying total of more than 40 per cent replied. Of the entire list written to—replying or not—7 per cent renewed, 13 per cent were obliged to cut expenses (the editors can appreciate and forgive this only too well!), 10 per cent had found PD not to their liking in varying degrees from luke warm to chilly, 6 per cent have too many other magazines—and who has time to read six to a dozen weeklies, monthlies, bi-monthlies, and quarterlies? The remaining 4 per cent were deceased (replying by proxy), about to leave on foreign missions, had PD in the family.

We promised these persons their replies would be confidential; hence we omit names from the few quoted below:

"... As a layman with practically no scientific knowledge of any kind but with an avid interest in many things, I hoped to find PD giving me an interesting and educational bit of reading every so often. Unfortunately, I found very few such articles although I realize that, from a scientific standpoint, each story in the magazine was sound and of interest to other scientists in the same field.

"I remember particularly one story that interested me ... about the snakes and lizards of one section of the Mo-have Desert—some of their interesting habits, etc. ... Another item, not quite so interesting to me personally, was the story of the last remaining Indian of one tribe in Northern California.

"No doubt, the fault is mine in that I want scientifically sound articles written dramatically instead of in the form of scientific papers. Perhaps the choice of subjects may have something to do with it because there are many colorful things that attract a great many people and there are more that are rather dry and uninteresting to the average person ...

"I know I am expecting too much from any magazine and that basically, PD is an organ for the California Academy of Sciences rather than a publication designed to please the layman ..."

If we were replying personally to this ex-reader we would give thanks for the honesty of the letter, and might go on to say that some of our readers feel PD would be better if it were not designed primarily to please the layman—there isn't enough in it for scientists; some wonder why we

EDITORIAL Who Is "The Reader"?

THE CALIFORNIA ACADEMY OF SCIENCES launched *Pacific Discovery* a year and a half ago in order thereby to come nearer meeting an obligation. This charge upon the Academy is the self-appointed task of advancing popular education in the natural sciences, an effort paying off in two-sided coin. One side relates to the furtherance of a cultural aim, the enriching of the inner or the higher life, which alone has long been deemed a worthwhile end. Obversely, we see more sharply every day the need for tying man himself back into the *physical* pattern whose outline is gradually emerging from the dark of our ignorance. Someone has to remind the man who spends his life behind a desk, a steering wheel, a television screen, or some other mechanical eight-ball that he too is an animal and subject to laws more binding than those symbolized by the cop on the corner.

For nearly a hundred years this Academy, like most such institutions, has concentrated largely on the cultural and "pure science" aspects of natural history. But the time has come for us to be much more than a "cabinet of specimens." We must be a place where the plain man may come to learn how he fits into the pattern of the physical world—especially, how he has collectively got out of kilter with it, and how he can readjust to it. We must show him where he is blindly hacking away at its props and why he'd better cease and desist from such unlawful activity—or else.

The plain man is You, "The Reader." But our use

here of two hackneyed concepts in tandem reads back as a memo to ourselves, the editors, never to forget Readers are people, not abstractions. We must try to keep in touch with them. We do know this about *PD* readers (and the knowledge is our daily challenge), that howsoever plain, or lay, persons they may be with respect to the details of scientific information, they are far from plain, or average, in attitudes, cultural interests, and critical acumen. They are the people to whom art museums, symphony halls, and academies of science are important as the treasure-houses, meeting-places, and show-windows of culture. A good many, besides, like Mr. Freer on the page opposite and Mr. Bradley whose letter he cites, have fast-growing insight into this highly controversial body of hypothesis, experiment, fact, and principle we call Conservation. A number are eager students, some professionals, in the natural sciences. Perhaps many of them, after all—and this would be reason enough for publishing *PD*—just want their science literature a few cuts above the Sunday supplements and a good deal less esoteric than, say, the "Proceedings" or what have you of the scientific societies. We know also, from the letters sung in low, or flat, monetary key, that at least a few have problems in common with curators and editors.

Whoever *You* are, Reader, please keep in touch with *us*. It takes vocal readers as well as writers and—necessary evil—editors to keep a magazine hot. D.G.K.

don't make it an organ for the California Academy of Sciences instead of trying to keep it a magazine of general interest for non-members too.

"... *PD* gave me entertainment and enlightenment in each issue ... much as if I were going along with field parties in their searches and investigations. For your information, in no way a criticism, the published articles suited me in different degrees, some in more detail than I desired, others in not enough detail. This is but natural. Those articles I read but briefly were doubtless just those which another reader desired in all their fulness ... All ... had the credit and value of coming from investigators, researchers, writers who were not amateurs in their fields of science. Here was the value.

"I did not renew my subscription, first because my activities are more and more restricted and I cannot read as much as I desire; second, I have to pare my budget because I must educate a son ..."

"I have enjoyed reading *PD* during the past year, and think it very well balanced for a natural science magazine, serving a need which we have had for a long time here on the Pacific Coast.

"... I regret having to discontinue my subscription. However, I am now going to medical school and tuition and supplies mean I have to keep a tight check on the old pocketbook. Sorry."

*That was one of several which make the editors wish an angel would descend upon this institution with a fund for the express purpose of keeping up the subscriptions of impecunious students. In all humility, we feel that *PD* could contribute, however little, to their broader education.*

"... Will use this opportunity to compliment you for undertaking the work of publishing such a magazine in and for this western country. I like the magazine very much and have enjoyed reading it during the past year. However it is rather expensive, although not excessive in comparison with other magazine prices. In thinking it over, have decided to continue for at least another year, and assure you of my desire of continued success for *PD*."

*This gives an excuse for the observation that *PD* goes to subscribers at less than cost—printing, paper, and plates are sky-high, and we are holding to a firm policy of top quality in all three. Two things will bring our costs—our price too, we trust—down in the future: many more subscribers, and more advertising. In answer to some: we do not intend to become a monthly in the foreseeable future, but do hope eventually to increase our pages.*

One letter was solemnly addressed, according to the card, to "Miss So-and-so, etc., Dear Miss So-and-so:" The reply is our favorite of the lot:

"My DADDY has A SUBSCRIPTION."



Bamboo lime tubes, tobacco containers, and love letters inscribed in the Hanunóo script. Five of the inscribed articles shown, together with several hundred other bamboo "manuscripts," are now temporarily in the Anthropology Museum, University of California at Berkeley. (Photograph by H. A. Figueras)

HAROLD C. CONKLIN

Bamboo Literacy on Mindoro

IN THE RUGGED MOUNTAINS OF SOUTHWESTERN MINDORO live the Hanunóo, one of the least known of the eighty-odd ethnic groups inhabiting the Philippine Islands. Isolated geographically, self-sufficient to an amazing degree, having contact with exceedingly few outsiders, and without formal schooling of any sort, these five to six thousand mountain folk have nevertheless distinguished themselves among Philippine pagans as *literate* tribesmen. During 1947 I had the opportunity of living with these interesting people and learning about their unique way of life and, especially, about their script.

Here, in use, I found one of those Philippine Islands scripts Professor A. L. Kroeber calls "...

the most remote descendants of the ancient Sanskrit alphabet." Except among one neighboring tribe, the Buíd, and a few of the Central Tagbánuwá on Palawan Island, there are no other surviving Indic scripts in the Philippines today, and only among the Hanunóo does a high degree of literacy in this syllabic form of writing still prevail. At the time of Spanish discovery and occupation of the archipelago in the 16th century most of the advanced Filipinos, including the Tagalog, Bisaya, Iloko, Pangasinan, Pampanga, and Bikol lowlanders, were well acquainted with similar scripts, often writing on palm spathes with cuttlefish ink or inscribing the Indic characters on the shiny surface of bamboo with a sharp-pointed

Photographs by the Author

piece of iron. Early Spanish chroniclers such as Morga (1609) often commented on the facility of both men and women in writing in this fashion. And the first book published in the Philippines, the *Doctrina Christiana* in 1593, was printed in Spanish and Tagalog, the latter both in Gothic letters and Tagalog (Indic) characters. During the following century, however, the Roman alphabet completely replaced the original script wherever Christianity became established. The Moros of Mindanao and southern Palawan, of course, had already begun to use Arabic letters even before the arrival of the Europeans. Thus, only in the remote interiors of a few islands, especially central Palawan and southern Mindoro, did certain pagan groups retain the ancient form of Indic writing until recent times.

Other peoples in Malaysia, such as the Batak and Lampong of Sumatra, Bugis and Makassar of southern Celebes, the Balinese, and the Javanese, have also retained forms of Indic scripts which spread into these areas and developed during the period between the early centuries of the Christian Era and the spread of Islam over most of the East Indies in the 15th century. Writing was most frequently inscribed on the light-colored leaves of the lontar palm (*Borassus flabelliformis*) or on sections of bamboo, although horn, other plant materials, and even copper plates were used occasionally. As time passed, paper came into more and more common use, and some of these scripts, under the Netherlands Indies government, were taught to the local populace in the elementary schools (as is still done in eastern Java, Bali, and southern Celebes). Originally, many of the more permanent writings in Indonesia were of religious, magical, or mythological import.

On Mindoro, however, I found that the Hanunóo possess no inscriptions of this sacred or semi-historic nature. But on the other hand, they have preserved their script in a much more indigenous manner—not yet having learned the use of paper nor having entered any classroom other than their jungle home. Before I describe their unique use of this ancient script it might be well to sketch the condition in which I found the Hanunóo in 1947, so that we may better comprehend what it has meant to these people to have been left out of the stream of Western and more advanced Philippine cultural influence for many centuries, in an area where the efforts of missionaries, soldiers, and teachers, so important throughout most of the

other islands in the archipelago, have rarely penetrated.

The mountainous terrain in which the Hanunóo live is largely covered by dense jungle and second growth forests of bamboo. In some areas, on more gradual slopes, extensive grazing fields of tough cogon grass have kept back the forest in parts previously burnt over for cultivation but now lying fallow. There are no roads and even the trails are rarely wide enough for more than single-file travel on foot. In certain sections near the coast either Philippine ponies or carabao may be employed, but in the interior even these means of transportation must be abandoned.

The Hanunóo favor promontories as sites for their many scattered communities, each of which consists of a group of five or six houses. There are no Christian settlements, schools, or government establishments within the area. Hanunóo houses are sturdy four-cornered structures raised several feet from the ground on wooden posts, roofed usually with cogon thatch, and floored with whole sections of bamboo which have been cracked and beaten flat like boards. Tree houses are frequently used as granaries. The size and character of Hanu-



Thatched hut built originally for the bone bundles of the dead and later occupied by the author during several months' residence in this Hanunóo community. Bamboo pole leaning against the doorway is the "ladder."



Detail of construction of Hanunóo bamboo house. The floor is of bamboo poles beaten flat. Cooking pot was made by the neighboring Buíd. Their pottery is a major item of trade with the Hanunóo, who, in turn, supply the Buíd with salt and other items from the coastal region.

nóo communities are largely determined by the nature of their inhabitants' upland cultivation of various food crops in vast "dibble fields" known throughout the Philippines as *kaingins*.

In these clearings, carefully fenced and guarded against pigs, monkeys, deer, and cattle, these mountain farmers raise a surprising number of food crops, the more important of which are rice, bananas, corn, sweet potatoes, taro, yams, and beans. Although their principal sustenance crops, by far, are bananas and rice, variety is not lacking. For example, of the former they cultivate more than *twenty-five* edible varieties ranging from the giant 12- to 14-inch cooking banana (*tindok*) to the sweet finger-sized *yakyakúw*. As each family group must clear, burn, fence, plant, guard, and harvest annually two or three of these frequently tremendous upland plots (sometimes covering upwards of 15 acres each), most of the men, women, and children find continual year-round employ-

ment in one activity or another related to the maintenance of productive *kaingins*. This is not to say that the Hanunóo are 100 per cent vegetarians nor that they ignore the many natural food products which their jungle habitat affords. Wild pigs, deer, and wild fowl are trapped or hunted with spear or bow and arrow. Streams furnish shrimps, fish, and crabs. Domestic Asiatic cattle (*Bos indicus*), pigs, and chickens are kept in most communities; and mushrooms, wild roots, berries, fruits, and bee honey supplement the food staples already mentioned. Beyond their immediate needs the Hanunóo usually manage to produce enough surplus crops to purchase, by trade with marginal Christians, the few luxuries and some necessities—



Grain storage hut built on the bole of a lopped tree, 10 or 12 feet above ground. Short bamboo pole slanting against doorway is the "ladder." For some reason the Hanunóo do not use the type of ladder we know.

such as scrap iron and needles—which must come from the outside world.

Hanunóo men fashion their own bolo blades, knives, spear points, and weapons, using a piston-bellows type of Malayan forge. The women, during the long evenings and by the light of pitch candles, card, spin, and weave their home-grown cotton into blankets and clothing. Even their main source of dye, indigo, is of their own cultivation. Baskets of more than fifteen distinct weaves are also the work of women, while the men excel in the carving and incising of tubular bamboo containers (usually for areca nut and other “betel” ingredients) and in the manufacture of bamboo zithers, and combs, scabbards, and other utensils from wood and coconut shell. Abacá and various bast fibers are twisted into strong ropes and cord, while human hair suffices for the strings of several types of musical instruments.

The Hanunóo lack a rigid clan or tribal organization and are actually without any central political figures such as chiefs or appointed head men; the basic social and economic unit is the local family group which respects as advisers its eldest male members, and consists usually of a man and his wife, or wives, their unmarried children, and the families of their married daughters. By the custom of matrilocality a man loses his own sons at the time of their marriage, but gains productive sons-in-law as his own daughters are espoused. The apparent lack of a powerful leader demonstrates well the Hanunóo passion for self-sufficiency and non-aggressive living. They tend to fear controls of any kind other than the adherence to customary law and tradition. They also fear conflict and are most unwarlike, retreating farther into the mountains rather than cause any disturbance of local peaceful conditions. During the recent war they had virtually no contact with either Japanese or American troops. When an occasional dog-fight took place over their territory they ran to the family burial caves for safety and to be near their ancestors. Their long arrows, almost always tipped with deadly poison, might suggest a more combative spirit, but actually these and other Hanunóo weapons are never used except in hunting forest game.

Some degree of social distinction may be gained by an individual who becomes a skilful blacksmith, a successful herder, or an expert basket weaver—but it is very slight. Perhaps the most respected members of Hanunóo society are the med-

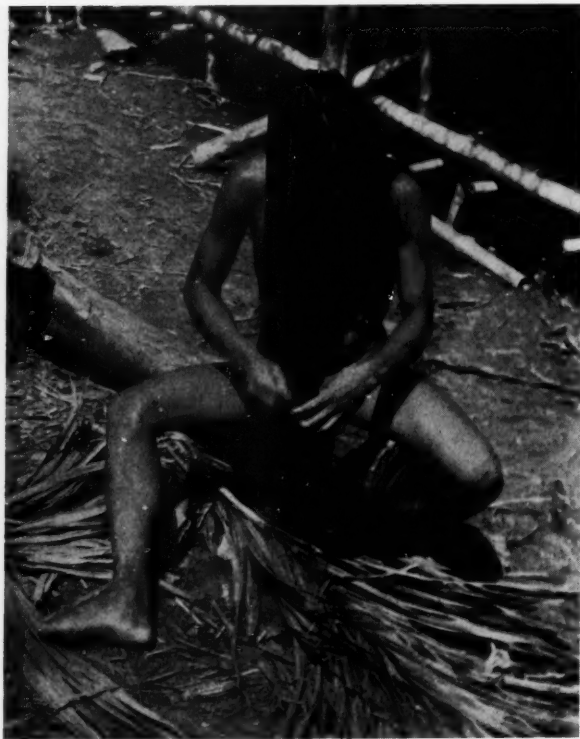


Hanunóo man dressed for the panlúdan. He wears a white cotton loin cloth and shirt, heavy necklaces of beads, coiled wire, and plaited fern stems, a red cloth headband, cotton ligatures below the knees, and numerous metal finger rings. His pouch of black fern stems and buri palm leaves contains the ingredients for betel chewing in bamboo tubes, as well as sundry personal items. The bolo is in constant use around home and in field or jungle.

icine men who are capable of chanting to the benign deities, the *dániw*, and compelling them to fight off the perpetual enemies of the Hanunóo, the invisible, superhuman *labáng*. Even such persons are hard to distinguish from the average Hanunóo farmer except while practicing their supernatural rites in the event of illness or crop failure. The only material possessions which are highly valued are the strings of small white and red trade beads used for religious offerings, as payment for the services of a shaman, and for personal adornment.

Most Hanunóo men present a very striking appearance, with their long, white, homespun loincloths and tight-fitting shirts of the same material,

bead pendant earrings, red head cloths, up to several pounds of neck beads, brass anklets and brilliant arm bands. The women dress in dark blue cotton skirts, breast bands of woven fern stems,



A young man combing his hair is a familiar sight. A man with short hair evokes expressions of disgust.

anklets, armlets, metal finger rings, about twice the poundage of neck beads commonly worn by a man, and occasionally a loose cotton blouse. Both sexes carry long bush knives in carved wooden scabbards at their waists, and smaller knives stuck in wide, all-purpose, woven, rattan pocket belts which also serve to protect the "mana-charged" bezoar stones one may be fortunate enough to own, which assure success in hunting, courting, and the like. Both sexes also file their teeth flat and chew certain ferns which coat the teeth with a shiny, black substance. Their lips are vermillion most of the time from the constant chewing of the *úpat-ka-patar-ári* ("four brothers": areca nut, tobacco leaf, betel pepper leaf, and slaked lime). In dress and personal habits the Hanunóo are most conservative. The men, for instance, do not cut their long, flowing hair, which they believe pro-

fects them from the heat and incidentally supplies the essential raw material for repairing broken guitar strings. Men frequently keep their hair done up in a bun, but cutting it is quite another matter. Once when I was traveling with a Hanunóo hunter we happened to meet another pagan on the trail who had cut his hair. Even though he was clad in a loin cloth and was obviously not a Christian, my companion later remarked disapprovingly, "*Damóong yi ngáni túnda pag táwo túnda, daót!*" (That fellow's already a lowlander; how disgusting!)

As indicated by some of the foregoing remarks, Hanunóo religious beliefs center around a fear of evil spirits who must be propitiated or repulsed through the services of a shaman, and by ancestor worship. The *kalág*, spirits of the dead, may, like the *labáng*, cause sickness and misfortune, should they be forgotten or neglected at certain feasts, dances, and rituals. The most important of these rites and also the biggest socio-religious event of the year is known as *panlúdan*. At this time, usually following the rice harvest, the bones of those relatives who have been dead and buried for at least a year are exhumed, attired in the most elegant of Hanunóo dress, placed in special houses, and offered special food daily. After a week of these preliminaries, hundreds of previously notified Hanunóo tribesmen gather in the huge dance pavilion erected specifically for this purpose, and for two or three days the sponsor must slaughter sufficient head of cattle and numerous pigs, pound rice, and cook to feed the hungry crowd until he has completely exhausted his own food supply. Although the main reason for holding the *panlúdan* is to please the spirits of the deceased (whose bone bundles are carefully weighed at the end of the ceremonies to determine whether or not they have been satisfied—if they have, it is believed that the bones will have become appreciably lighter and should then be placed with other bundles in the family burial cave), the occasion calls for great feasting, dancing, courting, singing, and merrymaking on the part of all visitors. The ceaseless serenading continues from dusk to dawn, the girls responding with songs and flute music or by playing on bamboo Jew's-harps. All the finery possessed by the young dandies and maidens—most of it especially prepared for the occasion—will be worn, and lovers will exchange token gifts such as fancy knife sheathes and finely woven utility baskets of palm leaves and rattan.

It is this highly stylized method of courting and serenading witnessed during a panlúdan which brings us back to the subject of bamboo literacy, since the popularity of both men and women dur-

formal instruction in the use of this script. There is not even a definite order, comparable to that of our alphabet, for memorizing the forty-eight basic and derived characters. We may get some idea,



LEFT: A Hanunóo farmer. He has just put down a heavy load—note marks of a shoulder strap across his chest. RIGHT: Hanunóo man showing the usual method of doing up the hair, and a common style of pendant earring. Lower necklace is author's dog-tag chain!

ing these get-togethers is largely determined by the number of traditional love songs they are capable of singing and their ability to fit every occasion with a suitable chant. To collect and learn a large number of these chants it is most essential that one be able to read. In other words, the incentive to learn the use of their ancient syllabary does not stem from a desire merely to preserve the old form of writing so much as it does from the interest taken by young people of both sexes in building up a repertoire of as many of the traditional love songs as possible.

Some Hanunóo communities in the central area are more than 60 per cent literate! This includes women as well as men. In one family I lived with for several months, all of the adults except one were literate. And yet there is a surprising lack of

however, of the procedure for learning how to read and write among the Hanunóo from the following typical example:

A young lad has begun to take a serious interest in the girls of several neighboring communities. Thus, following custom, he also spends considerable time with those of his older male relatives who are good singers, trying always to pick up additional verses which may be of use in serenading. On hearing his uncle sing a long and particularly pleasing song, he asks him to write down the words on a lime tube made from an internode of bamboo. His uncle obligingly unsheathes his small knife and with the sharp point inscribes the entire song, syllable by syllable, on the hard, shiny surface of the bamboo, holding one end of the tube close to his body, writing in the direction away

RIGHT: Left-handed Hanunóo man writing on bamboo in "mirror script." Plaited fern stem arm bands hold sweet-smelling herbs to add to his charms during the panlúdan. His bracelets are open copper rings.

BELOW: Young Hanunóo man in everyday dress, showing the normal, right-handed use of the small belt-knife to incise the syllabic script on a section of a bamboo tube. The typical pocket-belt is visible above his loin cloth. His squat is common among native Filipinos.



from himself in columns which follow to the right. (In other words, we can say that the script proceeds from bottom to top and from left to right.) While the boy's uncle is finishing the inscription he explains that each character stands for only one syllable. Then, while repeating the song aloud, they both go over the writing carefully, following with a finger each of the incised marks. The boy then does this by himself, becoming more and more familiar with the different character elements and checking with his uncle when in doubt. Since a lime tube is an indispensable personal item and is always carried in one's shoulder pouch, the boy is able to review the characters contained in this song every time he prepares a chew of betel. After a few days he has learned them perfectly and begins to practice writing by copying the same inscription on the back of his bamboo self-bow, gradually developing the proper technique of inscribing each of the characters with his own knife. Soon he returns to his elders for criticism, other songs, and additional characters. In this way, and partly because of the amazing simplicity of

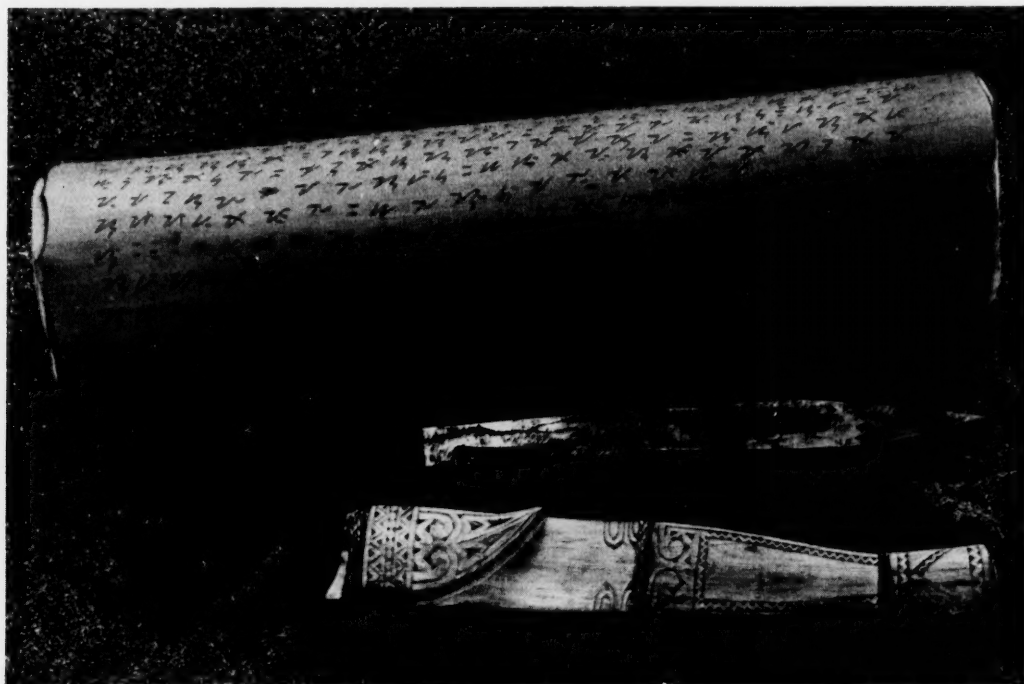
the script itself, it is possible to learn the entire syllabary within only a few weeks' spare time, although it may take several years to be able to write rapidly while keeping the characters in successively straight columns on the curved surface of bamboo.

Once the script is mastered, any number of bamboo or wooden objects, such as tobacco containers, musical instruments, weapons, and even house beams, may be inscribed with various chants. There is, of course, one other important use of the script: namely, for correspondence. Most common letters of request, notification of ceremonies, and the like are written on scrap pieces of bamboo. Love letters, however, such as the one which appears in the center of the photograph on page 4, are meticulously inscribed on neatly trimmed internodes, and are frequently embellished with incised designs in the form of scrolls, wavy and zigzag lines. Letters are carried by anyone who happens to be going in the direction of the addressee's village. As far as permanent writings are concerned I found nothing save contemporary, perishable "manuscripts." In order to retain the oldest songs and riddles, continual copying from one bamboo cylinder to another is

necessary, since there are no rock inscriptions and the ever-present tropical weevils make the preservation of bamboo records for more than one generation impossible.

One of the many other peculiarities of this Hanunóo writing, and one not found in any other Indic script in Malaysia, is that which allows the left-handed to write in a completely inverted manner, in a "mirror script," holding the knife in the left hand and reversing both the axis of the characters and the direction in which the columns progress. Using our letters, this would mean writing **ƆIƆƆA ⅄A** (beginning at the right) for **AN APPLE**. Because of the syllabic nature of the Mindoro script this method of writing, in Hanunóo, can be read almost as rapidly as that used by those who are right-handed.

Until the Hanunóo country is opened up by the construction of roads, an influx of Christian home-steaders, and the establishment of schools, these peaceful, self-providing mountain folk will probably continue the use of their script much as it exists today, using knives for pencils, bamboo for paper and remaining literate without schools, in a jungle area parts of which have not yet been explored by any outsider.



Hanunóo bamboo manuscript and small knife used for writing. In some areas the incised characters are blackened with charred coconut meat, as in this specimen. The knife is also used for shaving, cutting and eating food, preparing materials used in various handicrafts—it is, in short, an all-purpose tool. The sheath is carved out of a soft wood, in two halves held together by woven bands of finely split rattan. All three articles are in the author's collection. (Photograph by F. L. Rogers)

Wildlife IN AMERICAN CULTURE

ALDO LEOPOLD



THE CULTURE OF PRIMITIVE PEOPLES is often based on wildlife. Thus the plains Indian not only ate buffalo, but buffalo largely determined his architecture, dress, language, arts, and religion.

In civilized peoples the cultural base shifts elsewhere, but the culture nevertheless retains part of its wild roots. I here discuss the value of this wild rootage.

No one can weigh or measure culture, hence I will waste no time trying to do so. Suffice it to say that by common consent of thinking people, there are cultural values in the sports, customs, and experiences which renew contacts with wild things. I venture the opinion that these values are of three kinds.

First, there is value in any experience which reminds us of our distinctive national origins and evolution, i.e., which stimulates awareness of history. Such awareness is "nationalism" in its best sense. For lack of any other short name, I will call this, in our case, the "split-rail value." For example: a boy scout has tanned a coonskin cap, and goes Daniel-Booneing in the willow thicket below the tracks. He is reenacting American history. He is, to that extent, culturally prepared to face the dark and bloody realities of the present. Again: a farmer boy arrives in the schoolroom reeking of muskrat; he has tended his traps before breakfast. He is reenacting the romance of the fur trade. Ontogeny repeats phylogeny in society, as well as in the individual.

Second, there is value in any experience which reminds us of our dependency on the soil-plant-animal-man food chain, and of the fundamental organization of the biota. Civilization has so cluttered this elemental man-earth relation with gadgets and middle-men that awareness of it is growing dim. We fancy that industry supports us, forgetting what supports industry. Time was when education moved toward soil, not away from it. The nursery jingle about bringing home a rabbit skin to wrap the baby bunting in is one of many reminders in folklore that man once hunted to feed and clothe his family.

Third, there is value in any experience that exercises those ethical restraints collectively called "sportsmanship." Our tools for the pursuit of wild-

life improve faster than we do, and sportsmanship is a voluntary limitation in the use of these armaments. It is aimed to augment the role of skill and shrink the role of gadgets in the pursuit of wild things.

A peculiar virtue in wildlife ethics is that the hunter ordinarily has no gallery to applaud or disapprove his conduct. Whatever his acts, they are dictated by his own conscience, rather than by a mob of onlookers. It is difficult to exaggerate the importance of this fact.

Voluntary adherence to an ethical code elevates the self-respect of the sportsman, but it should not be forgotten that voluntary disregard of the code degenerates and depraves him. For example: a common denominator of all sporting codes is not to waste good meat. Yet it is now a demonstrable fact that Wisconsin deer hunters, in their pursuit of a legal buck, kill and abandon in the woods at least one doe, fawn, or spike buck for every two legal bucks taken out. In other words, half the hunters shoot any deer until a legal deer is killed. The illegal carcasses are left where they fall. Such deer hunting is not only without social value, but constitutes actual training for ethical depravity elsewhere.

It seems, then, that split-rail and man-earth experiences have zero or plus values, but that ethical experiences may have minus values as well.



THIS, THEN, DEFINES ROUGHLY three kinds of cultural nutriment available to our outdoor roots. It does not follow that culture is fed. The extraction of value is never automatic; only a healthy culture can feed and grow. Is culture fed by our present forms of outdoor recreation?

The pioneer period gave birth to two ideas which are the essence of split-rail value in outdoor sports. One is the "go-light" idea, the other is the "one-bullet-one-buck" idea. The pioneer went light of necessity. He shot with economy and precision because he lacked the transport, the cash, and the weapons requisite for machine-gun tactics. Let it be clear, then, that in their inception, both of these ideas were forced on us; we made a virtue of necessity.

CONSERVATION

In their later evolution, however, they became a code of sportsmanship, a self-imposed limitation on sport. On them is based a distinctively American tradition of self-reliance, hardihood, woodcraft, and marksmanship. These are intangibles, but they are not abstractions. Theodore Roosevelt was a great sportsman, not because he hung up many trophies, but because he expressed this intangible American tradition in words any school-boy could understand. A more subtle and accurate expression is found in the early writings of Stewart Edward White. It is not far amiss to say that such men created cultural value by being aware of it, and by creating a pattern for its growth.

Then came the gadgeteer, otherwise known as the sporting-goods dealer. He has draped the American outdoorsman with an infinity of contraptions, all offered as aids to self-reliance, hardihood, woodcraft, or marksmanship, but too often functioning as substitutes for them. Gadgets fill the pockets, they dangle from neck and belt. The overflow fills the auto trunk, and also the trailer. Each item of outdoor equipment grows lighter and often better, but the aggregate poundage becomes tonnage. The traffic in gadgets adds up to astronomical sums, which are soberly published as representing "the economic value of wildlife." But what of cultural values?

As an end-case consider the duck hunter, sitting in a steel boat behind composition decoys. A put-put motor has brought him to the blind without exercise. Canned heat stands by to warm him in case of a chilling wind. He talks to the passing flocks on a factory caller, in what he hopes are seductive tones; home lessons from a phonograph record have taught him how. The decoys work, despite the caller; a flock circles in. It must be shot at before it circles twice, for the marsh bristles with other sportsmen, similarly accoutred, who might shoot first. He opens up at 70 yards, for his polychoke is set for infinity, and the advertisements have told him that Super-Z shells, and plenty of them, have a long reach. The flock flares. A couple of cripples scale off to die elsewhere. Is this sportsman absorbing cultural value? Or is he just feeding minks? The next blind opens up at 75 yards; how else is a fellow to get some shooting? This is duck shooting, model 1949. It is typical of all public grounds, and of many clubs. Where is the go-light idea, the one-bullet tradition?

The answer is not a simple one. Roosevelt did not disdain the modern rifle; White used freely

the aluminum pot, the silk tent, dehydrated foods. Somehow they used mechanical aids, in moderation, without being used by them.

I do not pretend to know what is moderation, or where the line is between legitimate and illegitimate gadgets. It seems clear, though, that the origin of gadgets has much to do with their cultural effects. Homemade aids to sport or outdoor life often enhance, rather than destroy, the man-earth drama; he who kills a trout with his own fly has scored two coups, not one. I use many factory-made gadgets myself. Yet there must be some limit beyond which money-bought aids to sport destroy the cultural value of sport.



NOT ALL SPORTS have degenerated to the same extent as duck hunting. Defenders of the American tradition still exist. Perhaps the bow-and-arrow movement and the revival of falconry mark the beginnings of a reaction. The net trend, however, is clearly toward more and more mechanization, with a corresponding shrinkage in cultural values, especially split-rail values and ethical restraints.

I have the impression that the American sportsman is puzzled; he doesn't understand what is happening to him. Bigger and better gadgets are good for industry, so why not for outdoor recreation? It has not dawned on him that outdoor recreations are essentially primitive, atavistic; that their value is a contrast-value; that excessive mechanization destroys contrasts by moving the factory to the woods or to the marsh.

The sportsman has no leaders to tell him what is wrong. The sporting press no longer represents sport, it has turned billboard for the gadgeteer. Wildlife administrators are too busy producing something to shoot at to worry much about the cultural value of the shooting. Because everybody from Xenophon to Teddy Roosevelt said sport has value, it is assumed that this value must be indestructible.



AMONG NON-GUNPOWDER SPORTS, the impact of mechanization has had diverse effects. The modern field glass, camera, and aluminum bird-band have certainly *not* deteriorated the cultural value of ornithology. Fishing, but for outboard motors and aluminum canoes, seems less severely mechanized than hunting. On the other hand, motorized transport has nearly destroyed the sport of

wilderness travel by leaving only fly-specks of wilderness to travel in.

Fox-hunting with hounds, backwoods style, presents a dramatic instance of partial and perhaps harmless mechanized invasion. This is one of the purest of sports; it has real split-rail flavor; it has man-earth drama of the first water. The fox is deliberately left unshot, hence ethical restraint is also present. But we now follow the chase in Fords! The voice of Bugle-Anne mingles with the honk of the flivver! However, no one is likely to invent a mechanical fox-hound, nor to screw a polychoke on the hound's nose. No one is likely to teach dog-training by phonograph, or by other painless shortcuts. I think the gadgeteer has reached the end of his tether in dogdom.



IT IS NOT QUITE ACCURATE to ascribe all the ills of sport to the inventor of physical aids-to-sport. The advertiser invents ideas, and ideas are seldom as honest as physical objects, even though they may be equally useless. One such deserves special mention: the "where-to-go" department. Knowledge of the whereabouts of good hunting or fishing is a very personal form of property. It is like rod, dog, or gun: a thing to be loaned or given as a personal courtesy. But to hawk it in the marketplace of the sports column as an aid-to-circulation seems to me another matter. To hand it to all and sundry as free public "service" seems to me distinctly another matter. Even "conservation" departments now tell Tom, Dick, and Harry where the fish are biting, and where a flock of ducks has ventured to alight for a meal.

All of these organized promiscuities tend to depersonalize one of the essentially personal elements in outdoor sports. I do not know where the line lies between legitimate and illegitimate practice; I am convinced, though, that "where-to-go" service has broken all bounds of reason.

If the hunting or fishing is good, the where-to-go service suffices to attract the desired excess of sportsmen. But if it is no good, the advertiser must resort to more forcible means. One such is the fishing lottery, in which a few hatchery fish are tagged, and a prize is offered for the fisherman catching the winning number. This curious hybrid between the techniques of science and of the pool hall insures the overfishing of many an already exhausted lake, and brings a glow of civic pride to many a village Chamber of Commerce.

It is idle for the professional wildlife managers to consider themselves aloof from these affairs. The production engineer and the salesman belong to the same company; both are tarred with the same stick.



WILDLIFE MANAGERS ARE TRYING to raise game in the wild by manipulating its environment, and thus convert hunting from exploitation to cropping. If the conversion takes place, how will it affect cultural values? It must be admitted that split-rail flavor and free-for-all exploitation are historically associated. Daniel Boone had scant patience with agricultural cropping, let alone wildlife cropping. Perhaps the stubborn reluctance of the "one-gallus" sportsman to be converted to the cropping idea is an expression of his split-rail inheritance. Probably cropping is resisted because it is incompatible with one component of the split-rail tradition: free hunting.

Mechanization offers no cultural substitute for the split-rail values it destroys; at least none visible to me. Cropping or management does offer a substitute, which to me has at least equal value: wild husbandry. The experience of managing land for wildlife crops has the same value as any other form of farming; it is a reminder of the man-earth relation. Moreover, ethical restraints are involved; thus managing game without resorting to predator-control calls for ethical restraint of a high order. It may be concluded, then, that game cropping shrinks one value (split-rail) but enhances both of the others.



IF WE REGARD OUTDOOR SPORTS as a field of conflict between an immensely vigorous process of mechanization and a wholly static tradition, then the outlook for cultural values is indeed dark. But why cannot our concept of sport grow with the same vigor as our list of gadgets? Perhaps the salvation of cultural value lies in seizing the offensive. I, for one, believe that the time is ripe. Sportsmen can determine for themselves the shape of things to come.

The last decade, for example, has disclosed a totally new form of sport which does not destroy wildlife, which uses gadgets without being used by them, which outflanks the problem of posted land, and which greatly increases the human carrying capacity of a unit area. This sport knows no bag limit, no closed season. It needs teachers, but

not wardens. It calls for a new woodcraft of the highest cultural value. The sport I refer to is wildlife research.

Wildlife research started as a professional priestcraft. The more difficult and laborious research problems must doubtless remain in professional hands, but there are plenty of problems suitable for all grades of amateurs. In the field of mechanical invention research has long since spread to amateurs. In the biological field the sport-value of amateur research is just beginning to be realized.

Thus Margaret Morse Nice, a housewife, studied song sparrows in her back yard. She has become a world-authority on bird behavior, and has outthought and outworked many a professional student of social organization in birds. Charles L. Broley, a banker, banded eagles for fun. He discovered a hitherto unknown fact: that some eagles nest in the South in winter, and then go vacationing to the north woods. Norman and Stuart Criddle, wheat ranchers on the Manitoba prairies, studied the fauna and flora of their farm, and are recognized authorities on everything from local botany to wildlife cycles. Elliott S. Barker, a cowman in the New Mexico Mountains, has written one of the two best books on that elusive cat, the mountain lion. Do not let anyone tell you that these people made work out of play. They simply realized that the most fun lies in seeing and studying the unknown.

Ornithology, mammalogy, and botany, as now known to most amateurs, are but kindergarten games compared with what is possible for (and open to) amateurs in these fields. One reason for this is that the whole structure of biological education (including education in wildlife) is aimed to perpetuate the professional monopoly on research. To the amateur is allotted only make-believe voyages of discovery, to verify what professional authority already knows. What the youth needs to be told is that a ship is abuilding in his own mental dry-dock, a ship with freedom of the seas.

In my opinion, the promotion of wildlife research sports is the most important job confronting the profession of wildlife management.



WILDLIFE HAS STILL ANOTHER VALUE, now visible only to a few ecologists, but of potential importance to the whole human enterprise.

We now know that animal populations have behavior patterns of which the individual animal is unaware, but which he nevertheless helps to execute. Thus the rabbit is unaware of cycles, but he is the vehicle for cycles.

We cannot discern these behavior patterns in the individual, or in short periods of time. The most intense scrutiny of an individual rabbit tells us nothing of cycles. The cycle concept springs from a scrutiny of the mass through decades of history.

This raises the disquieting question: do human populations have behavior patterns of which we are unaware, but which we help to execute? Are mobs and wars, unrests and revolutions, cut of such cloth?

Many historians and philosophers persist in interpreting our mass behaviors as the collective result of individual acts of volition. The whole subject-matter of diplomacy assumes that the political group has the properties of an honorable person. On the other hand, some economists see the whole of society as a plaything for processes, our knowledge of which is largely *ex post facto*.

It is reasonable to suppose that our social processes have a higher volitional content than those of the rabbit, but it is also reasonable to suppose that we, as a species, contain population behavior patterns of which nothing is known because circumstance has never evoked them. We may have others the meaning of which we have misread.

This state of doubt about the fundamentals of human population behavior lends exceptional interest, and exceptional value, to the only available analogue: the higher animals. Errington, among others, has pointed out the cultural value of these animal analogues. For centuries this rich library of knowledge has been inaccessible to us because we did not know where or how to look for it. Ecology is now teaching us to search in animal populations for analogies to our own problems. By learning how some small part of the biota ticks, we can guess how the whole mechanism ticks. The ability to perceive these deeper meanings, and to appraise them critically, is the woodcraft of the future.

To sum up, wildlife once fed us and shaped our culture. It still yields us pleasure for leisure hours, but we try to reap that pleasure by modern machinery and thus destroy part of its value. Reaping it by modern mentality would yield not only pleasure, but wisdom as well.

*"... A totally new form
of sport which does not
destroy wildlife, which ...
calls for a new woodcraft of
the highest cultural value
... is wildlife research."*

DON BLEITZ

Sandhill Cranes at Sunset

*Taken at Bitterlakes Wildlife Refuge
near Roswell, New Mexico. These
beautiful birds fly over the Bitter-
lakes region in migration. Their reso-
nant calls can be heard for several
miles over the marshes.*

*Photographed at 1/1000 f.11 with a
17" lens, using Super Panchro film;
Pyro Acetone Developer, by inspec-
tion 1 hour and 30 minutes.*

PHOTO CENTER





DOLPHINS—Little-known Mammals of the Pacific

VICTOR B. SCHEFFER

A REWARD TO THE NATURALIST is the occasional chance to study an uncommon species of animal. I have recently had the privilege of handling and photographing two small members of the whale family which are often seen by travelers at sea but are seldom captured and brought in for examination. These are the Dall porpoise and the striped dolphin. A porpoise and a dolphin, as you know,



Biologist Bill Sholes harpooning a Dall porpoise in the Inside Passage to Alaska. Float in foreground is ready to be tossed overboard.

are similar. Both are members of the family Delphinidae and their common names are often used interchangeably, although the term *porpoise* is usually reserved for snub-nosed species and the term *dolphin* for long-snouted species.

In the winters of 1947 and 1948 the U. S. Fish and Wildlife Service sent a group of us into the North Pacific and the Bering Sea to trace the migrations of the Alaska fur seal. We traveled on the *Black Douglas*, a steel-hulled motor ship, 140 feet long, fitted out as a seagoing laboratory. Aboard at one time or another were Bill Sholes (now with the California Division of Fish and Game), Karl W. Kenyon (Fish and Wildlife Service), Bob

Brown (Swarthmore College), and Raul Vaz-Ferreira (Servicio Oceanografico y de Pesca, Uruguay). As a secondary project during the course of our investigation we gathered information on porpoises. We started out with the determination to capture a few specimens for the National Museum in Washington, D.C., for we realized that measurements, weights, and photographs of Delphinids are, as compared with similar data for land mammals, notably meager. Many of the specimens of Delphinids found in museums of the country today are fragmentary, grease-stained bones with incomplete data. They represent material salvaged from carcasses found on the beach. We set forth with two kinds of harpoons for capturing the animals, one to be fired from a shoulder gun and one to be thrown by hand. Both proved effective.

Our course in 1947 led us north from Seattle along the curve of the North American coast to the Aleutian Islands. In 1948 we repeated the cruise, with an additional trip from Dutch Harbor across the lonely North Pacific to San Francisco in December.

Going north from Seattle, we began to see Dall porpoises in the Inside Passage of British Columbia near Queen Charlotte Strait. The Dall porpoise is a handsome, black and white, streamlined creature about six feet long, with a weight approaching 250 pounds. It travels alone or, more commonly, in groups of two to six and up to twenty-five. It has the habit of cruising in a spirit of fun beside a moving ship. No doubt it gets the same thrill out of this that a native Hawaiian does out of riding a surf board. I have noticed that, for one reason or another, certain individual porpoises will rush in toward a ship while others will turn away in alarm. Perhaps animals living along a well-used steamer track learn the habit of playing while those in less visited waters remain shy. Or perhaps certain individuals are full of fish and too lazy to play on occasion. There's a lot to be learned about the behavior of porpoises.

The first warning a Dall porpoise gives of its presence is a burst of spray as it breaks the surface to breathe, plunging along at a speed of five to fifteen knots. The exchange of air through the blowhole takes less than a second and is announced by an explosive *chuff*! If the animal is in a playful

mood, it heads for the ship and starts to glide back and forth under the bowsprit, or in the spreading white rollers along the beam. The power strokes of its body are so clean and smooth that the effect is as though the owner were being towed by a taut, invisible wire.

This is how we collected specimens: When the lookout on the bridge called "Porpoise ahead!" one of us ran to the bow and fastened the harpoon line to a wooden float which was kept in readiness there. We did this quickly by hooking a D-ring on the line to a snap swivel on the float. We usually held our fire until the target was within a range of ten to twenty-five feet. We preferred to harpoon a porpoise traveling a little to one side of the ship rather than one directly ahead for we feared that if the target was struck directly ahead, the harpoon line might pass under the keel of the ship and be cut by the propeller. In rough weather we found it difficult to keep our feet on the rolling ship and to draw a bead on a slippery, plunging target. Even in good weather the task was not easy. We managed to strike about one out of four porpoises at which we aimed.

Following the thrust of the harpoon we had ten or twenty seconds in which to pick up the float and heave it overboard before the last of the line was paid out. The ship then circled back and the porpoise was hauled on deck by means of a manila line looped around the tail near the flukes. The recovery of the specimen was carried on in the turmoil of advice from the crew, shouting of the captain, trampling of feet, and trailing of lines and pike poles over the deck.

On several occasions we saw porpoises gliding along the ship at night, their ghostly bodies outlined by the greenish luminescence of the water. We once tried to use the harpoon at night but had visions of becoming entangled in the bight of the line and, like Ahab, sounding to the depths of the sea. We did not repeat the experiment.

After the heavy porpoise was safely on deck we prepared it for biological study. We hoisted it by the tail and photographed it from three angles—back, side, and belly. When a porpoise is suspended by its tail, the contour of the body is fairly lifelike. We preferred to photograph on a dull day or in the shade of the wheel-house in order to avoid reflections from the glistening body. (I believe that, of all the natural history subjects I have tried to photograph, a porpoise is the most difficult.)

The next move was to weigh the animal. We used a beam scale or steelyard and found that it was easily carried and withstood rough usage. Our largest Dall porpoise, a male, weighed 245 pounds and the largest female weighed 222 pounds. One can determine the sex of a porpoise by examining the belly region. In both sexes the vent or anus lies about one-third the distance from the tail to the snout. In the male, the penis rests in a slit which lies well forward of the vent, near the middle of the belly. In the female, there is a genital slit forward of and adjacent to the vent, and a concealed nipple on either side of the slit.

We measured the specimen, recording about twenty dimensions, the most important of which were the straight line distance from tip of snout



Photographs by the Author

A Dall porpoise, playing at the bow of the ship, rises in an explosive rush for a fresh breath of air.

(upper lip) to tail notch, and girth of body immediately behind the flippers.

We then carefully removed the head with a large knife, devoted about ten minutes to paring off the excess meat, and fastened to the skull a wooden tag with a catalog number. Our ship had a refrigerator in which we stored skulls intact for removal to Seattle—not, however, without certain bitter remarks from the ship's cook. Lacking this storage we would have removed the flesh, cleaned out the brains with a bent wire, salted the skull thoroughly and kept it on deck in a cool place. We also dissected the two small bones lying an inch or two beneath the belly skin near the vent—pelvic rudiments thought to represent degenerate hind limbs.

We then sliced open the body and removed the stomach, as well as the fetus if present, which we pickled in a 10 per cent solution of commercial formalin. The stomachs were found to contain squid, lantern fish, and herring.

Edible steaks can be sliced from two long muscles, each the size of a man's arm, that lie on either side of the backbone. These muscles explain the tremendous speed and agility of the porpoise. The flesh is dark red and fine grained, with a pleasant flavor like venison. The fat or blubber, however, has the persistent, faint "oily" odor characteristic of marine mammals. We found that the flesh of a striped dolphin from California was softer and poorer in quality than that of a Dall porpoise from the colder waters of Alaska.

While we have not tried to preserve the rubbery skin of a porpoise, a well known taxidermist tells us that it can be salted and tanned. The leather of the beluga, or white whale, has long been used commercially in the manufacture of fancy shoe laces.

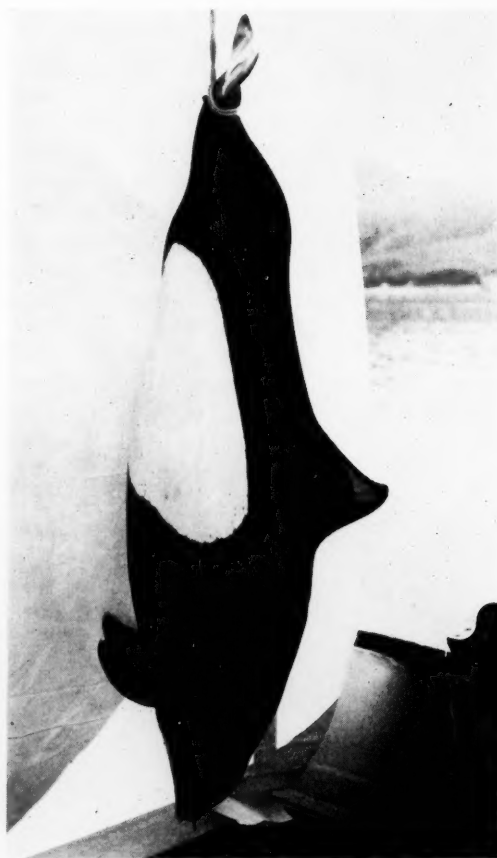
Upon our return to Seattle the thrill of the expedition was over and we were faced with the job of cleaning the skulls for permanent storage. Fortunately, we had on hand a colony of slaves to do the dirty work. These were dermestid beetles, better known as carpet beetles, which we kept in a large coffin-like tank at room temperature. The beetles ate the dried flesh down to the last shred and we subsequently degreased the skulls by warming them in carbon tetrachloride. The skull of a cetacean is very oily, and if this oil is not removed it eventually turns brown and rancid and attacks the limey structure of the bone.

We have dealt thus far with the Dall porpoise,

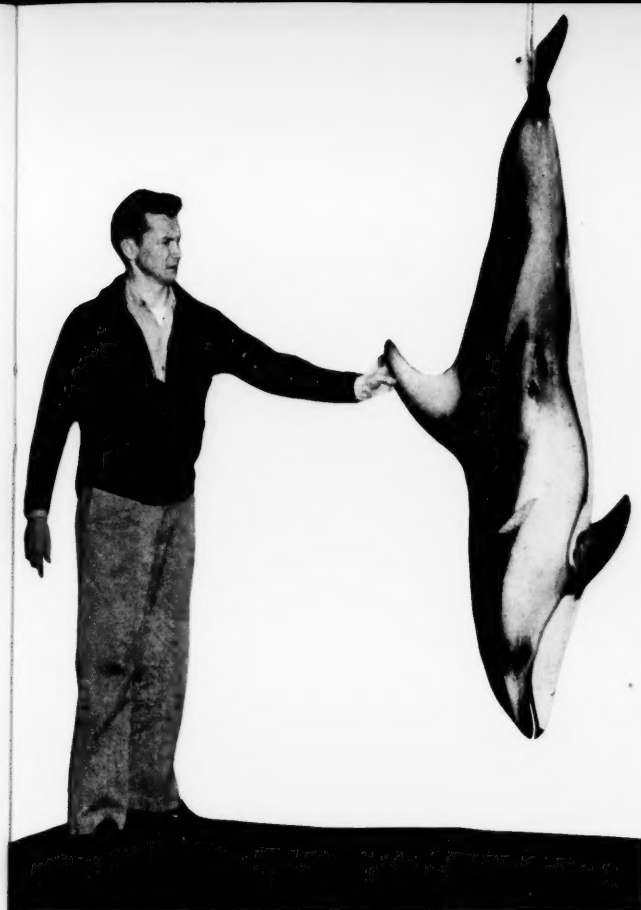
of which we were able to secure five specimens. We also landed one striped dolphin while we were running ten miles off Farallon Island on the 12th of December. Biologist Kenyon recovered this one with the aid of a hand harpoon. We were quite thrilled to have the specimen for study, since it was a 209-pound female carrying a two-pound fetus. Little is known about the reproductive habits of Pacific Delphinids, and we were naturally glad to add this breeding record to the fund of scientific knowledge.

The behavior of the striped dolphin is similar in many respects to that of the Dall porpoise. The dolphin travels in groups of up to forty or more and, on occasion, plays at the bow of a ship. After previous experience in watching the porpoise at play we were able to distinguish the dolphin by its quieter, more subdued rush and by other little mannerisms, more easily sensed than described.

There are at least six species of dolphins or porpoises ranging along the Pacific Coast about which



A mature male Dall porpoise collected in Stikine Strait, Alaska—weight, 224 pounds.



Biologist Karl W. Kenyon with striped dolphin taken off Farallon Island in December—adult female, 209 pounds.

basic scientific information is needed—species which, I believe, can be taken by the naturalist with an ordinary hand harpoon. These are:

(1) The Dall porpoise, *Phocoenoides dalli*—California to the Aleutian Islands; usually within 100 miles of shore; common from southeast Alaska to Shelikof Strait. We found them here from May to December and presume that they are present the year 'round.

(2) The striped dolphin, *Lagenorhynchus obliquidens*—Monterey to Puget Sound. We saw dozens within sight of land along the California-Oregon coast in December. Captain C. T. Larsen of the research vessel *Catalyst* has harpooned three or four specimens in the Strait of Juan de Fuca with a hand iron.

(3) The long-snouted dolphin, *Stenella graffmani*—Baja California and California. In 1940, a fisherman told us that at one time he operated a small power boat among the Channel Islands of southern California. He gathered seals and porpoises and sold them to a processor of cat and dog foods. He harpooned several dozen porpoises a day under favorable circumstances. The unfortunate victims were probably long-snouted dolphins. (A closely related species, *S. eu-*

phrosyne, is known from the American shoreline by two specimens only.)

(4) The common dolphin, *Delphinus bairdii*—warm and temperate waters. I use the name "common" because the *Delphinus* of the Atlantic Coast has long been known under this name. Perhaps in California and Mexico the species is uncommon. As far as I know, the only specimens which have been taken from the West Coast are two captured by Captain Scammon in 1872 off Point Arguello, California.

(5) The bottle-nosed dolphin, *Tursiops* species—Baja California and California; common on the Atlantic Coast but little known on the Pacific. A specimen was taken in 1871 in Monterey Bay.

(6) The right whale dolphin, *Lissodelphis borealis*—San Diego to Bering Sea; probably rare and offshore. This animal has been captured only once, a century ago, about 500 miles off the mouth of the Columbia River. I have had an opportunity to examine two carcasses stranded on the Washington coast. This dolphin resembles a right whale in lacking a dorsal fin.

Specimens of Delphinids from the Pacific Ocean are especially needed to dispel the uncertainty as to their systematic position. That is, we don't know exactly what scientific names to apply to the majority. We wonder whether they are identical with similar species in the Atlantic which were described in the pioneer days of scientific nomenclature. And the only way to clear up the uncertainty is to obtain a series of specimens of comparable age and sex, both of the Atlantic and the Pacific forms.

Before leaving the subject of porpoise collecting I should like to call your attention to the fact that Delphinids are entirely without legal protection from state, provincial, or Federal game departments along the Pacific Coast. Their protection depends upon the efforts of thoughtful citizens at large. Porpoises should never be hunted wantonly or for sport, for there aren't enough of them and their natural rate of recruitment is low. There are certainly too few of them to withstand sustained commercial exploitation on the scale



Pelvic rudiments of the Dall porpoise, slender bones representing the last traces of ancestral hind limbs.

that was attempted by the pet-food man I mentioned a moment ago.

Although Delphinids are unprotected by law they are, fortunately, sheltered to a certain extent by a feeling of regard on the part of seafaring men. Porpoises are friendly companions during the long monotonous watches at sea. And, so we are told, they will guard the body of a sailor lost



Harbor porpoise, cross-section showing the thin black skin, white blubber, heavy muscles.

in a storm and gently nudge it to shore to be recovered by friends. (I do not vouch for the truth of this statement.)

I have listed six Pacific Coast cetaceans that can probably be taken by hand harpoon. There are others which, because of their habits or large size, cannot be obtained in this way by the naturalist. For example, the little harbor porpoise (*Phocoena vomerina*), widespread in the bays and inlets of the North Pacific, is difficult to approach by boat. The specimens we see are usually individuals drowned by accident in fish nets. Several years ago I found one which had choked to death while swallowing the body of a shad. The blackfish

(*Globicephala scammonii*) is both large and wary. We chased a group of blackfish off Monterey in December but were unable to keep up with their diving and twisting.

As we lay in Unalaska Bay on Thanksgiving Day a fisherman boarded the *Black Douglas* to report the body of a "prehistoric monster" about twenty or thirty feet long stranded on a beach nearby. His theory was that the carcass had recently emerged from the snout of a glacier where it had lain entombed in the ice for centuries and had finally dropped into the Bering Sea in a berg. We took the ship over to investigate but could not land on account of a heavy surf. We arranged with an interested native to recover the head of the monster. About two months later it arrived in Seattle on the motorship *Penguin*, its black snout jutting from a large barrel and smelling as only a very dead whale can smell. After we cleaned up the skull, we found that it was from a Baird beaked whale (*Berardius bairdii*), a species of which there are not over a half-dozen specimens from the west coast of North America.

With regard to the larger whales of the Pacific Coast, the sperm and the whalebone species, there is little that the average naturalist can add to the fund of scientific knowledge by study of stranded carcasses. Long range, intensive studies of whales are being carried on by trained investigators at shore stations and on floating factories in the Antarctic and in other parts of the world. The hunting of whales is regulated by international law.

For those who would like to read further about the habits of porpoises and dolphins and see illustrations of the various kinds, I recommend an article by Remington Kellogg, "Whales, Giants of the Sea," in the January 1940 issue of the *National Geographic Magazine*. There is also an informative book by two English naturalists, J. R. Norman and F. C. Fraser, entitled *Giant Fishes, Whales and Dolphins*, published by W. W. Norton and Company, New York, 1938.

Skull of right whale dolphin showing the long beak and the many sharp teeth used for capturing squid and small fish.



BORYS MALKIN

Lagos, Nigeria

DEAR PD:

The first four months after my last report* I devoted to wanderings about Nigeria, including a quick scouting trip into the British Cameroons (this will be included in my next). I covered about 6,000 miles—only the short distance from Lagos to Benin City by plane, close to 900 by rail (not recommendable), and 80 per cent of the total by motor. The road travel was chiefly via native lorries or "buses." What sort of transportation these provide my aching bones could tell.

It had better be said at the beginning that this will be an informal log of one traveler's journey and the impressions he gained in a country probably little known to most Americans. For organized general information about the British West Africa colony and protectorate of Nigeria, see the encyclopedias and the books I shall mention on the way.

Nigeria is a large country, almost the size of Texas and California put together. You see then how traveling would use up a lot of time. It would be impossible in *PD's* space to comment on all the places I have visited. I'll attempt only to tell you something about the most interesting localities I covered.

Early in February I started out for Northern Nigeria, through Ibadan and Ogbomosho to Ilorin, where I stopped several days. Ilorin is an important place. While it still comes within the Yoruba country the section is known as Ilorin Emirate. For down to Ilorin penetrated Islamic influences and the people are predominantly Moslem. The characteristic blue dye of the cloth, however, is a Yoruba feature.

While I was at Ilorin the *harmattan* was at its peak. The sky was shaded and the sun covered by an elusive mist of dust particles which during the dry season the winds are said to bring from the Sahara. It is a hot, drying wind, this *harmattan*, and persisted throughout my stay and until the end of March. The skin dries and cracks, streams dry up, often completely, vegetation shrinks, foliage shriveling or falling off. Mornings as well as nights are quite cool, afternoons more than usually cool — relatively speaking — but the absence of bright sun and the excessive dryness are depressing and, if prolonged, create a gloomy feeling in people. The *harmattan* is perhaps the most important physical phenomenon of these parts—but more of that later.

From Ilorin I went on to Kabba, 164 miles to the east, traveling with Mr. W., a Nigerian government accountant from Kaduna who was making an inspection

trip to various local treasures. Taking me along with him in his pickup he solved my transportation problem—greatest handicap in Nigeria—for two weeks.

On the way to Kabba the country is very thickly populated and has been so for centuries. As elsewhere throughout Southern Nigeria the forest has long been stripped for cultivation. Kabba itself is in savannah very much depleted by cultivation. On reaching the town, we first parked at a rest house on a high hill with a beautiful frangipani tree in full bloom and stately mangoes.

For several days in Kabba I was able to proceed with field work undisturbed. I spent considerable time in the burned out areas where the soil was densely covered with cicada's cones. The larvae make these structures and are said to be especially fond of such burns. My efforts to secure cicadas weren't very successful until I bought a pea-shooter from a boy for a penny and proceeded to shoot them down with sand grains, imitating the method the late W. T. Davis of Staten Island, New York, used to employ. Once the world's greatest authority on cicadas, he told how he shot them down with salt grains. If the Academy's curator of entomology discovers some of these insects in my collection with parts of wings missing or otherwise damaged he will know how they were captured.

From Kabba we went on to Lokoja at the confluence of the Niger and Benue rivers. It was less than 60 miles through very pleasant savannah, green and fresh looking. The country is uninhabited for more than 40 miles. This is in the forest reserve and we did not meet any villages until almost the very town of Lokoja. The hills are lower and flatter, almost table-like mountains, certainly part of the rising (and desiccating) plateau marking the former level of the Niger. En route we met up with a troop of baboons; nearly 25 of them crossed the road ahead of the car. Two great males stopped within ten feet of us, but when we backed up they scurried away into the growth so fast I couldn't take any snaps of them.

Here is a low and hot and stuffy country. The Niger is still huge but flowing through savannah, its banks extended for miles under grasses and reeds, as also in Niamey. The population is incredibly mixed, with a great many Moslems. Tiv (or Munchi), Hausa, Fulani, Yoruba, Ibos, Kukurukus, Nupe — all these tribes and others swarm into Lokoja, especially in connection with the river trade. The market is an interesting place, with the tailors working in the open on their sewing machines, protected from sun and rain only by canvas. Vultures swarm like chickens through the streets, snatching edible morsels from under the legs of passersby.

*Borys Malkin, "Saharan Contrasts," *Pacific Discovery*, January-February 1949.



Lokoja, Nigeria. Native craft line the banks of the Niger.

It was during my stay in Lokoja that the first storm since my arrival in Nigeria came over—first rain in four months, I was told. It appeared quite suddenly about 8 P.M. and was gone by 9. But during that brief hour it raged with great violence and the following morning I encountered several fallen trees in the town. The storm also drew out ants and termites. Two days earlier I had found the termites, the winged forms swarming out restlessly from the nest, and also ants—seemingly a forecast of coming rain which turned out to be true. And before the rain and for two days after, a great many insects came to the lights. I kept a chart for several days, marking off the relative degree of intensity in these swarms. Different groups kept on coming on different days. For example, the Staphylinid and Anthicid beetles and the Trichoptera (caddis-flies) came in great numbers the night before the rain but not at all after. But most other insects appeared in force the same evening after the rain or the following evening. The most interesting creatures to me were the ant guest beetles, the Paussids. As this is strictly an Old World family I had never taken any of them before except a pair in Townsville, Queensland. Now after the rain I scooped about 20. When touched they emitted a puff with a smell like that of the bombardier beetles (*Brachinus*, etc.)

Comparing my results from Ilorin, Kabba, and Lokoja I was struck by the differences in the fauna each of these places showed. All are more or less in a straight line from west to east, Kabba 150 miles from Ilorin, Lokoja 60 miles from Kabba. The general topography of the country seems similar enough, and also the type of savannah. Yet among the 700-odd species of insects I collected in all three localities, very few duplicates occurred. Even the aquatic beetles which usually have wide distribution of species showed considerable differentiation. But here I found these in-

sects very choosy about their habitat. Within the muddy river, a few yards away a species would become sparse. A pond in Ilorin, shallow, with fairly clear water and algae, and only a few yards away from the main stream of the river (actually it was left over from the flood season), harbored a very different fauna.

FROM LOKOJA we went back to Ilorin and then northward, after an overnight stop which proved profitable. Several Embioptera crawled to the light out of their crevices, all of them winged males.* Always these fellows clung to the wall or to my collecting canvas, then serving as a table cloth (on other occasions it was a blanket or a sunshade on the Niger). They always turned their heads toward the light in characteristic fashion, something I've seen no other insect do. This was a fortunate event, Embioptera being my number one objective on this trip.

We expected an uneventful run from Ilorin to Jebba. But 15 miles from Jebba two tires suddenly gave up. We patched them and practically strolled into Jebba where Mr. W. hoped to get new tires. But Jebba turned out to be of less importance than its railway bridge and works would indicate. No tires were to be had. We called a council of war, deciding that I would remain at the rest house with our cook, while Mr. W. drove back to Ilorin for the tires, returning in two days. Thus I unexpectedly had a few days in Jebba, a place of much interest.

Jebba's scenery is quite striking for this part of Nigeria. There is the great Ju-Ju (meaning malevolent magic) rock standing out high from the river and still revered by the natives. There are several flat islands in the river inhabited by the Nupe people and their riverine offshoot, the Kedes. From the railway bridges (two bridges, totaling 1,795 feet, cross the river via Jebba Island—only bridging of the Niger in the Colony) I had an excellent station from which to photograph the river and its settlements. The island of Jebba is famed for the fine pottery it produces, and has a distinctive architecture. It is here that the first large number of circular mud huts with pointed roofs appear. These houses are characteristic north of the Niger but one seldom sees them south of it.

I took a dugout canoe and crossed to one of the smaller islands. A few small settlements of fishermen were thriving there, the Kede people being among the very few Nigerian aborigines depending for livelihood entirely on river-fishing or trade. Nigerians are not water people, on the whole.

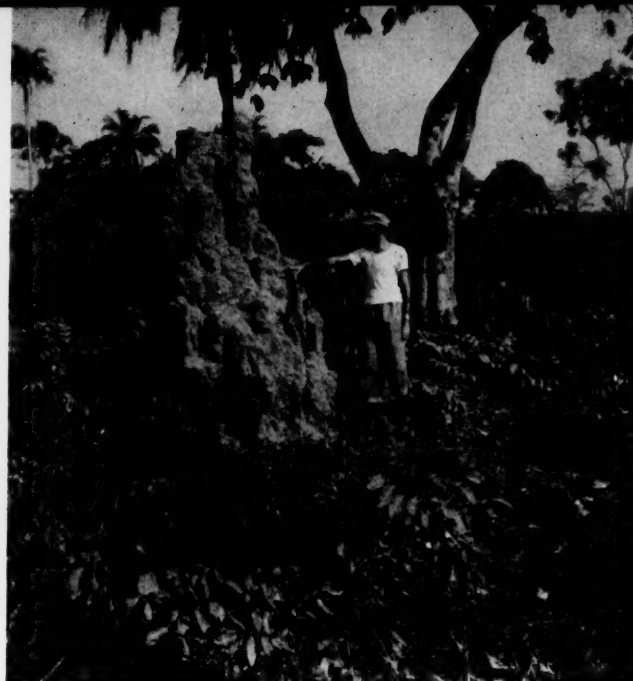
*A major objective of Borys Malkin's Africa expedition is to collect the little-known insect order Embioptera, silk-web spinners. Such specimens as those mentioned here are now an important part of the material Dr. E. S. Ross, Academy Curator of Insects, is using in his world study of the order.—Ed.

Giant termite nest near Kabba. Some are up to 20 feet high, sharply pointed.

On Jebba Island, I climbed a low hill where a monument is erected to the memory of Mungo Park and Richard Lander. The very rocky and arid hilltop is strangely reminiscent of the Sahara farther north, and just as if to make this impression stronger I discovered several Tenebrionids under a stone which were very closely allied to certain beetles I'd collected in Tabankori, French Sudan.

The obelisk bears a simple inscription: "To Mungo Park 1795 and Richard Lander 1830 who traced the course of the Niger from the source to the sea. Both died in Africa for Africa." Actually Mungo Park had not completed his journey. On his second attempt he perished at the Bussa Falls about 50 miles up from Jebba. It was Lander—one time personal servant to Clapperton, another of the early explorers of West Africa—who proved that the Niger actually did flow into the Guinea Gulf. The question of the flow of the Niger, like the question of the source of the Nile, for years occupied the minds of the arm-chair geographers and fired the imaginations of a band of explorers, many of whom died trying to solve the riddle.

Nowadays white men can live in West Africa, although perhaps not too comfortably. But in the early days it was indeed a "white man's grave." It is a gloomy list of disasters we read in accounts of the 18th and early 19th century explorations. Hostile tribes, usually at war among themselves and against all comers, and, even more, disease, against which no defense was known, took terrific toll. Casualties usually amounted to 80 or 90 per cent after only a few months. On his second expedition Mungo Park started out on an April 27, but in a letter to Lord Camden November 17 the same year he stated that only five Europeans out of 44 who left Gambia remained alive (*History of Nigeria* by Sir Alan Burns, fourth edition, London, 1948). Gradually, however, the casualties grew fewer, and Dr. Baikie's ship *Pleiad* which stood four months in the Benue and the Niger in 1854 lost none of her people, African or European. In 1857, parenthetically, Dr. Baikie in the ship *Dayspring* ascended the Niger as far as Jebba where he was wrecked on the Ju-Ju



rock. At the railroad station I saw fragments of the vessel which were recovered from the river some time later during the building of the bridge.

The following day on to Zungeru, the 178 miles covered in a day which exhausted me, the more so as I became violently sick during the day. But the trip was an interesting one. Immediately north of Jebba the vegetation is quite striking. The great many mimosas scattered wide apart remind one of the northern fringes of the French Sudan. Here too a great many termite nests are set, of a type I haven't seen elsewhere. These nests are very narrow, sharply pointed, and very tall, some perhaps as high as 20 feet. Unfortunately we couldn't stop.

Our next point was Bida, capital of the Bida Emirate and center of the Nupe tribe. The emir's palace is an altogether modern structure, of solid red brick and obvious Gothic affinities! I was sorry we could park only briefly in the market. But F. S. Nadel has recently made a lengthy study of these people; his results are published in an excellent monograph, *A Black Byzantium* (International African Institute, 1942). These low parts along the Niger and the Benue have an ill reputation. Nadel produces weather figures which show that both excessive humidity and heat are characteristic of the Bida area. The climate is very unhealthy with many diseases rampant, leprosy and tuberculosis having especially high incidence among the Nupe. Accordingly, the infant mortality is very high, and one out of every two children dies—in this the prevalence of malaria may be a chief factor. Under such conditions, we can well realize, early white explorers of the country took great risks.

As we pushed on toward Zungeru the savannah became greener, fresher, and denser, owing, perhaps, to



Railway bridge from Jebba to Jebba Island, over the Niger River. With its other span, not shown, this is the only bridging of the Niger in the colony of Nigeria. 25



the proximity of the Kaduna River. The mimosas disappeared.

ZUNGERU is a pleasant place to look at. Once a capital of Nigeria's northern provinces, it has been abandoned and today no permanent European settler lives here. In a way I rejoiced. The town is made up of circular huts and there is only one building covered by a metal roof—so ugly and unsuitable for the perpetually hot and humid climate. The Kaduna River flows through Zungeru in a deep granitic gorge. The river is very deep and its shores steep and sometimes inaccessible. This was a phenomenon entirely out of order with what I had seen so far in Nigeria.

The following morning, March 5, we left for Zaria. In Birnin Gwari we lunched in the large circular rest house with double mud walls and thatched roof. It offered much better "air conditioning" than the European houses. On the road we passed very few villages, and these small and scattered for this is one of Nigeria's least populous districts. The vegetation increases, and the trees are fuller with plenty of fresh foliage. Perhaps a natural savannah—or is it? This is a matter of controversy. Several years ago Professor E. P. Stebbing, the chairman of the forestry school in the University of Edinburgh, traveled through this region and farther north (of special interest to me in view of my recent journey through it were his comments on the area, between Niamey and Gao to the south and Colomb-Bechar to the north, through which he returned from Zinder), and described his impressions in a book, *The Forests of West Africa and the Sahara* (London and Edinburgh, 1937). Stebbing's ultimate conclusion was that all this region represented what is called "derived savannah"—that is, savannah not of the original type but transformed through burning. Burning, of course, is the most devastating human activity in Africa. The natives burn the forest com-



pletely for cultivation; they will burn savannah and grass for hunting, and so on. Yet the burning does not reach everywhere and could not account for the remarkable uniformity of the great stretches of savannah. Professor Stebbing furthermore cites certain areas northeast of Kano along a river as examples of the indigenous forest which in former times is supposed to have extended throughout the entire country. This seems like stretching a point. I have spent some time in Australia's Northern Territory. There the open eucalyptus savannah extends for hundreds of miles. Dense, impenetrable thicket and taller trees grow along the rivers. When the rainy season comes to an end the enormous grass, sometimes more than 10 feet high, simply falls to the ground to rot. There is no question of deliberate burning by men; now, as for ages past, Australia's population is exceedingly sparse.

From Zaria I traveled by train to Kano where I spent two days. Kano—here one feels the breath of the Sahara. The city is made up of three parts, one of which represents the old Kano city which once upon a time had as evil a reputation for strange travelers as did Timbuctu. The architecture is "Saharan" as I call it, rather than Moslem, with kindred structures of characteristic design extending far south to Bida. The arabesques on the faces of the houses and doorways and the designs are traditional. After seeing many of them you learn to recognize the pattern.

The remains of the old city's walls, destroyed by warfare, are in evidence, with the few gates standing intact. There is a great market full of people. As elsewhere in Nigeria, sellers of various products are grouped according to their wares. The saddle-makers are in one section, the salesmen of hats and fezzes in another, vendors of sheets or shirts in still another, and so on. Many of these sit under black umbrellas for protection against the sun, a not uncommon sight throughout Nigeria. While I gave my shoes to a street



LEFT: Nupe settlement, Jebba Island. CENTER: The market, where Haussas and Yorubas mix with the Nupe for trade. RIGHT: Nets of the Kede fishermen dry on a mango tree on their home islet in the Niger between Jebba Island and the town of Jebba.

shoemaker for repair, I went about with my camera.

Here were Hausa (or Hausa) people and the Fulani—but perhaps I'd better explain the terms as they are subject to the greatest confusion. Both are essentially linguistic, especially the term Hausa. The *Hausa* denotes merely the people speaking the Hausa language, a speech predominant in the northern parts of Nigeria and a great deal of the adjacent territory. But racially there is no unity and the Haussas form a conglomeration of tribes and physical types. In general it might be said that the Hausa language is also associated with the Moslem religion and customs and it happens to be usually tied up with a considerable degree of hamitic blood. Thus, people whom we call Hausa will usually show somewhat different features from the typical West African negro of the coast. Their noses are broader, the hair finer, and other features more slender and delicate.

The Haussas spread throughout all this territory as traders. They also established a more uniform administration than is found in the South.

As for *Fulani*, that is also a linguistic term, but perhaps the Fulani might be better defined racially. Of these people C. G. Seligman says (*Races of Africa*, London, 1930) that they are "divided into two sections, the 'Cattle Fulani' of whom the Aboro or Borore are the most typical, and the settled Fulani, or Fulanin Gidda as they are called in Hausa (*gidda*, house). The Nomads are the purist representatives of the hamitic element in Nigeria—straight haired, straight nosed, thin-lipped, long-headed, of slender physique and skin reddish brown in color, the women distinguished by their beauty and graceful carriage. In character they are exceedingly reserved, distrustful and shy, and, it is said, shrewd and artful, so that no African can excel them in dissimulation and finesse. The settled Fulani on the other hand, by free intermarriage and wholesale concubinage with the races

whom they conquered, are fast being absorbed by the negro as is shown by general coarsening in build and features and frequent appearance among them of the frizzly hair and prognathous mouth of the negro. Mohammedans by religion, they do not intermarry with the pagan 'Cattle Fulani,' and have given up essentially the Fulani customs still followed by the latter."

KANO IS A CITY PREOCCUPIED with the new West African crop, the groundnut (peanut to you). Huge pyramids—as if this were Egypt or Mexico—made up of bags of harvested nuts are everywhere. And with them comes the pest. In the evening millions of *Tribolium* beetles take to the air. Within half an hour I swallowed or bit on several and got one in each eye, which produced a most unpleasant irritation.

Kano is within reach of the southern Sahara and it is an important point. There is a great deal of wasteland around. It was after visiting this region that Professor Stebbing formed an opinion, later widely accepted throughout the world, of the "southward march of the Sahara." That in many places the Sahara advances south is indubitable, but not, as Stebbing claims, owing to human interference. There is the indisputable fact of progressive desiccation in Central and North Africa. The best evidence of the climatic change comes from the lakes of Chad, and even more strongly from East Africa. Incidentally, much of this evidence came to light in connection with archeological work (see L. S. B. Leakey, *White African*, London, 1937). I did see the advancing dunes on the outskirts of Gao. Not all agree with Stebbing. A more recent account by André Aubréville in *The Niger Colony Forestry Expedition*, September to December 1935



Granite gorge of the Kaduna River, from the bridge near Zungeru.

Photographs by the Author



(Forestry Department, Ibadan, 1937), suggests that much of the sand areas in the Niger Colony are hard beaten sands. The real danger, according to Aubréville, is in the harmattan which takes up much water in the deforested region with the result that sheet water is lowered. But there is uniform agreement on one point. Whatever the future of the agriculturists, it will ultimately depend on the preservation of the forest vegetation, whether savannah or other type. Otherwise sheet erosion will make the land worthless for agriculture, first, and for pasturage, later; and reclamation is a very, very slow and tricky business, especially within the bounds of the desert (Palestine would offer a good example here).

While I was in Kano the harmattan reached its worst. I left for Zaria without regrets as there the harmattan was less intense even though the two cities are less than 100 miles apart. (The smelly local train, second and third class only, takes five hours for the journey.)

This time I stayed longer in Zaria, four days. One day I walked toward the hills, a low but rugged granitic outcropping, dry and gray. Turning up stones, I found large Tenebrionid beetles and made a quick grab for them with the left hand, only to withdraw it rapidly, feeling a fire-like sting on one finger. Scorpion—I knew it at once without seeing the culprit. I immediately set out to uncover the beast and, indeed, found a medium-sized scorpion under the stone I'd just overturned. After bottling him up, I began to worry about the damage. It was painful. A very inconspicuous swelling appeared, and the pain grew. I started for town and on the way paid homage to the hospital, where an injection of 2 cc. of morphine into the finger eliminated the pain, but only for an hour. It persisted intensely until the following day, then vanished. That was all there was to it, but it was nevertheless the most painful thing I ever suffered from any invertebrate in all my years of field work.

In due time I was evicted from the rest house to make way for a government official and so moved on to a Catholic mission. There was a well nearby and daily palaver and fights over water went on among men and women. There I met up with a Gold Coast negro, an intelligent man. He told me he had a "wife" here as well as at home. I asked him how come and soon we discussed the problem of polygyny. Suddenly he suggested, "Suppose you have in a village three women and one man. What happens to two of these women if we insist on monogamy? Do they become prostitutes then?" I confess I had no answer as I clearly saw his point.

There are many Southerners in Zaria—Ibos, Yorubas, and others. They moved here in search of work and in this competition get ahead of the Haussas. Good knowledge of English is the striking feature

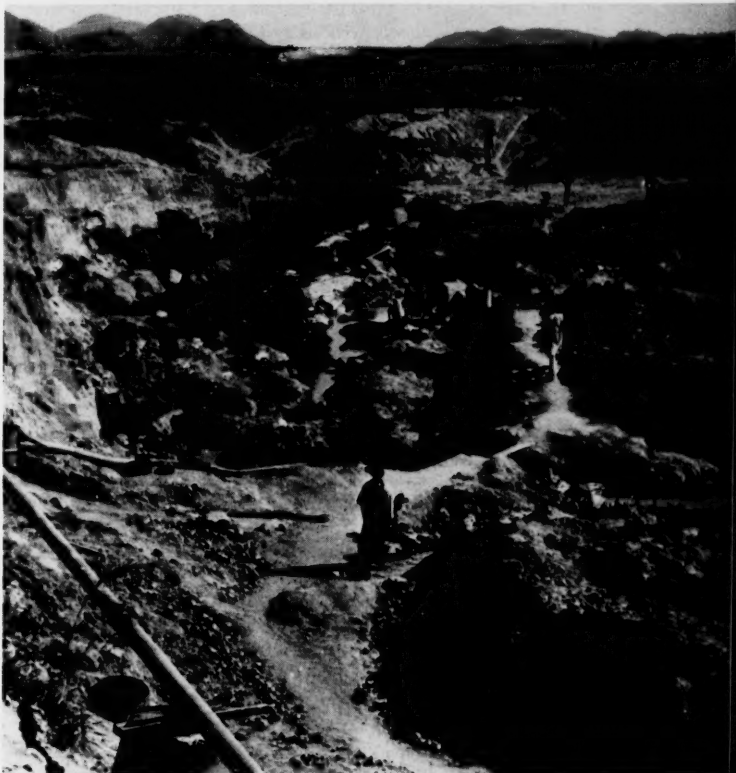
ABOVE: *Pyramids of peanuts in Kano.* MIDDLE: *Many Kano houses are decorated in traditional designs.* BELOW: *Young Haussa cobbler in the Kano market repairs author's shoes.*

among these Southerners when compared with the Hausa. They are also more volatile and excitable and perhaps more sensitive to personal insult than the hamitic people of the north.

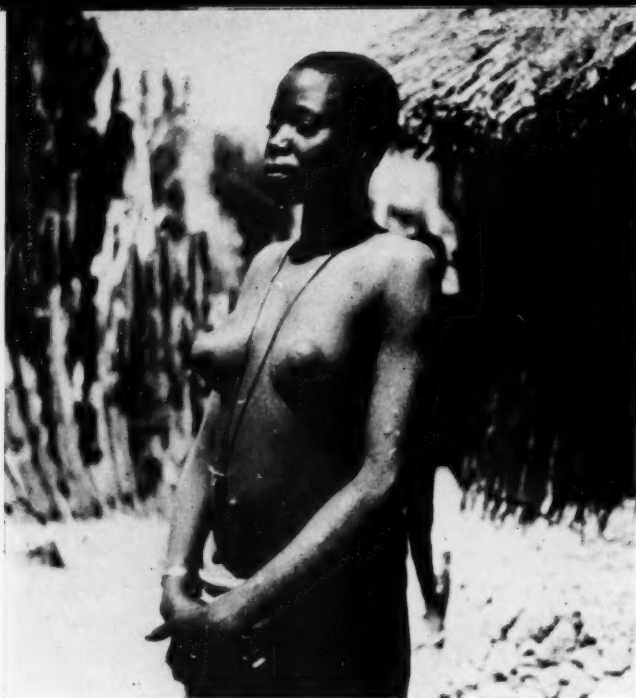
One evening I had a most interesting discussion with an educational officer from Sokoto, a young Englishman. He was one of the few Europeans I found in Nigeria openly sympathetic toward the native peoples, willing to see their point of view. His service in India with the Moslems taught him that, he said. It appeared that my notion of the superiority of the Islamic North was not very well founded. True, the Hamites have had the advantage of an administration well developed before British occupation. They have also a uniform language (Hausa) and a unifying religion (Islam), while in the South there are uncounted splinters of tribes and clans each with different religion and language and feebly developed administration. No political units comparable in scope and size to those of the North have developed there. Moreover, the Northerners have had the advantage of a written language, in an Arabic script, while the Southerners had no written language whatever—the first written word they ever saw in their own several languages was the Bible translated by the missionaries. Yet, the South is the more advanced part of Nigeria. Southerners are eager to learn English, in which they have access to a far greater variety of things and ideas than the Northerners have in the Hausa language. They are far more eager in seeking education and are better at learning trades and other occupations. One of the reasons lies no doubt in the conservative influence of the Moslem religion. This goes especially for the attitude toward women, who are kept under key in the North. Contrarily, Southern women are independent and while occasionally they might be thrashed by their husbands they control their own earnings (legally, too, which is more than can be said for the state of California). What a woman earns from the sale of her produce or handicraft is hers and may or may not be shared in her husband's household, as she wills.

JOS, MY NEXT STOP, is of a peculiar order. More than 4,000 feet high on the Bauchi Plateau, it is the chief European settlement in Nigeria. The climate here is drier and cooler. I arrived at the height of the dry season, but the residents told me that during the rainy season they had to wear sweaters and woollens as if in England.

The train comes up slowly to the plateau, once forested—on the slopes quite densely—but now barren. There are continuous ranges of hills rising several hundred feet above the general level of the country. Here the chief wealth is tin, of which Nigeria is the world's third greatest producer (after Malacca and Bolivia). And with the situation in Malaya plus the



ABOVE: *Euphorbia* hedges surrounding small hill villages in the Jos area may have been planted for protection against slave-raiding Fulani of early days. BELOW: Open pit mines near Jos are world's third ranking source of vital tin.



Fashion demands little of pagan tribesmen and women in the remote villages of the hills around Jos. Some natives of the Cameroons, however, would consider this woman definitely overdressed.



Yoruba woman weaving, in Ife, spiritual home of the Yorubas. With a culture in southwestern Nigeria possibly 3,000 years old, her people have a long tradition of craftsmanship.

good climate for permanent European settlement, Jos rapidly becomes Europeanized. Already the tin mines employ nearly 45,000 people and the numbers are increasing. The workers are recruited among all Nigerians but especially among the pagan tribes of the plateau with even women working.

So far Nigeria is free from the acute problems of race that plague East and South Africa, but a rapid and extensive increase in the native labor force and the European population (especially in the Jos area) may bring about the tragic results described and analyzed so masterfully for Rhodesia and Tanganyika by the Wilsons (Godfrey and Monica Wilson, *The Analysis of Social Change*, Cambridge, 1945). This, however, was not my problem while in Jos, and so I went off to the hills with my cameras and insect collecting equipment, going first to see the enormous open pit mines which yield the tin. Then away from them along small streams, hoping to find something in the vegetation of their banks. Nothing much grew around and I soon limited myself to aquatic work, which has been all along my most successful field in Nigeria.

Others were busy here, too. Individual negroes dug industriously with shovels, later filling pans or halves of gourds and washing the sand away in the stream. What was eventually left in these receptacles they collected in deep pans—dark particles of tin ore. This would be for their own uses or perhaps for sale in the local market.

The pagan tribes inhabiting the plateau are on the whole still among Nigeria's most primitive. They differ much in economy from the adjacent peoples (see D. Forde Scott and Richenda Scott, *The Native Economies in Nigeria*, London, 1946). Even in Jos they (particularly the women) wear little clothing—men a short G-string, women a bunch of leaves front and rear—in spite of the frequent cold weather to which these people are most sensitive. But the same sort of thing I observed in the Cameroons highlands near Bamenda, where many go about entirely naked.

I had an interesting glimpse of Nigerian archeology, thanks to Mrs. Fagg, wife of the government archeologist who was then away in Ife. I wanted to see certain finds I knew had been turned up in the plateau area. Mrs. Fagg, who herself knows a good deal of archeology, very kindly took me to the "museum" or rather a brick shack where the objects are stored until a proper building is erected. With me she went through the collection of artifacts of most varied types. Mr. Fagg has been doing this work in Nigeria for nearly ten years, and has greatly extended knowledge of Nigerian archeology. In his book *Stone Age Africa* (London, 1936) Leakey devotes only a few lines to the archeology of the colony; but since he wrote a great deal has been uncovered, representing very diverse cultural sequence.

The Old Stone Age is represented by great stone axes which are usually associated with Mousterian culture, Neanderthals. Then there is the polished or neolithic sequence, and finally from these emerge more recent artifacts, attesting to a more advanced culture. I could not see the sites where these discoveries were made as they were some distance away over poor roads. The most intriguing items found are the terra cotta figurines of considerable size—monkeys, and several representing human heads. These seem to have affinities with the Yoruba type in the South and also with the famous Yoruba bronze heads in Ife, and if further research confirms the present estimate of the age of these terra cottas and also their kinship with the Yoruba heads, it would place the Yoruba people in southwestern Nigeria for at least 3,000 years. Another find interesting to me was small tin and iron objects, evidence these metals were smelted here at an early date. The smelting and working of metals, iron especially, is believed to have come to the West African negro by way of Egypt (Sir Harry Johnston, *Opening Up of Africa*, London, 1911), but even so, here is good evidence of very early diffusion.

From Jos by train to Ibadan is almost a full two days' trip. At one place en route I noted a stream where trees and bushes were being cut down and burned along the bank. An anti-tsetse campaign. Thus the dreaded *Glossina* fly is deprived of its shaded breeding places. The method is quite effective—but what of the long view? Destruction of the vegetation for 50 yards on either side of the stream weakens the banks and facilitates and quickens erosion during the violent floods. It takes only a few years of erosion to ruin land for cultivation or grazing. What I saw exemplifies the effect of incomplete research. Not enough is known about the tsetse fly's life history, or its enemies, parasites, and the toxic substances which may help eliminate it and the deadly trypanosome it carries. Let us hope that in the war on the fly man will not render vast areas useless to him and other animals in a way far more terrible and permanent than that of the sleeping sickness.

Erosion is indeed a Damoclean sword in this part of Africa. The type of rainfall greatly increases the dangers to the land. The dry season is very thorough everywhere and complete in the North, all under the influence of the harmattan. The rainy season is quite brief, from six to as little as two months, but when it comes it consists of violent outbursts which strip off a great deal of topsoil. This is why erosion proceeds much faster in tropical and hot-desert areas than in temperate climates. Destruction of the forest increases the damage; the farmer shifts to new land and burns the forest and grass, using the new land until erosion guts it—and so on, the old familiar cycle. Plainly one of the most important things is to teach the native

better agricultural methods, especially the need for preserving the forest, an idea many missions have grasped and teach as one of the fundamentals.

We passed through Jebba again. Then in Ibadan for a day I tried to work on the Forest Lake surrounded by a plantation of *Cassias*, a fine achievement of the forestry department which has its headquarters in Ibadan. But the insects had become fewer during my six weeks away. Drought had lowered the level of the lake. Walking along, I frightened a great four-foot monitor lizard. The reptile dove right into the water and vanished.

In Ife I met Mr. Fagg; he has just begun excavations there. Ife is the spiritual home of the Yoruba people. I wanted to see the great bronze heads dating from the 12th century, but failed. The ruler of Ife, called Oni, happened to be away at the legislative assembly in Ibadan. Away with the great man was his factotum, who hangs on to the keys to the building where the heads are stored. Disappointed, I went out with Mr. Fagg to see his exploratory trenches and the town. After the week end I returned to Ibadan and then to Lagos.

My next move? I'm sailing in a few days for Victoria, British Cameroons, my headquarters until July.

Yours, BORYS



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NATURAL HISTORY OF MARINE ANIMALS. By G. E. MacGinitie and Nettie MacGinitie. McGraw-Hill Book Company, Inc., New York. 1949. xii + 473 pp., frontispiece and 282 text figs. \$6.00.

As compared with the ecology of the higher vertebrates, the ecology of marine organisms is a virtually untouched field. Even information on the habitat relationships of many of our most common shore animals is often unknown or available only to the specialist through articles in technical journals. Hence it is with pleasure that those interested in marine biology have greeted the very recent publication of Professor and Mrs. MacGinitie's book on the *Natural History of Marine Animals*. Although this volume has been available for only a few months, it has already been adopted as a text by several university classes in marine biology.

Briefly as to the arrangement of the book—there are 31 chapters of which the first 12 (100 pages) deal with such subjects as sense organs, habitats, growth rates, variation and succession, etc. The remaining chapters take up the natural history of the recognized zoological groups or phyla, such as the sponges, flatworms, lamp shells, etc. Of the 282 illustrations, 191 are new photographs of which the majority have not previously appeared in print. In addition, 69 of the 85 line drawings are apparently new. One advantage is that the material within the chapters is grouped under boldface headings, such as respiration, locomotion, habitat, feeding, size and age, enemies, reproduction, etc. This allows the reader ready access to the information in which he is primarily interested. The book is designed to be sufficiently nontechnical so that the layman may find it useful.

The importance of this book to the reader will probably lie solely in the natural history observations which he discovers for the first time. Some of these observations are a bit startling. As an example, most of us as children learned that the octopus threw out an inky "smoke screen" so that he could escape unobserved from his enemies. The MacGinities, however, point out that the screening effect is only secondary, and that actually the octopus ink contains a powerful smell-paralyzing substance which seems to be most effective against the octopus' chief predator, the moray eel. A barrage of octopus ink will desensitize the olfactory organs of a moray eel for as long as two hours. During that time the eel may repeatedly bump against the octopus, seemingly unaware of its presence. But as soon as the effect of the ink is dissipated, let the octopus beware, for unless he has a secure hiding place or an ample reserve supply of ink, he will most certainly find himself on his way down an eel gullet.

Unfortunately the excellence of the natural history observations is not equaled by the illustrations. Many of the photographs leave much to be desired and some

of the line drawings are highly inaccurate. And of course the specialist, who is never satisfied, would demand more detail and less generalization. Despite these matters, the book still presents much useful and interesting data.

At the time of this printing the MacGinities have just settled for a two year stay at the Naval Laboratory at Point Barrow, Alaska. Aside from his activities as scientific director of the laboratory, Professor MacGinitie will undertake a survey of the marine animals of the Point Barrow region. Thus students of marine biology may look forward to the results of some fundamental studies on the basic ecology of cold salt water organisms.

EARL S. HERALD

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The extent to which the California Academy of Sciences is fulfilling its public function is indicated by its growing membership and the increasing number of people entering its doors. The number of visitors in 1948 was 1,927,937. This represents an increase of 150,984 above the preceding year's figure.—*California Academy of Sciences Annual Report for the Year 1948.*

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"A TEMPLE OF THE MUSES"

ONE OF THE GREAT PROBLEMS OF OUR DAY, as it has been of the civilizations of the past, is that of maintaining flexibility of mind in an adult population. William James once remarked that most people become old fogies at 25. Occasionally we see a person who is mentally young and vigorous at an advanced age, and such individuals are universally beloved and admired. They are, however, a small minority of the population. We rightly speak of them as exceptional people. . .

In most people intellectual hardening of the arteries sets in at an early date. Minds become static and ideas become fixed. There is resistance to change, and a tendency to talk of the "good old days." It has always been thus. The Scriptures admonish us: "Say not thou, What is the cause that the former days were better than these? for thou dost not enquire wisely concerning this."

What is the difference between a person who is mentally old and one who is ageless? It is primarily a matter of intellectual curiosity. A mind becomes fossilized when the learning process stops. . .

The way to prevent fixation of mind is to keep intellectual curiosity alive. In this the schools have a part to play, and the press, and—let us not forget—the museums. These last can, in truth, play a major role in stimulating the mind and promoting intellectual adventure. A museum that is filling its proper function will never be dull and fusty, but will be instead—as the word implies—a temple of the muses.

—"Report of the Director," *California Academy of Sciences Annual Report for the Year 1948.*

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